



Institute for  
Fiscal Studies

---

## Public economics: Income Inequality

Chris Belfield

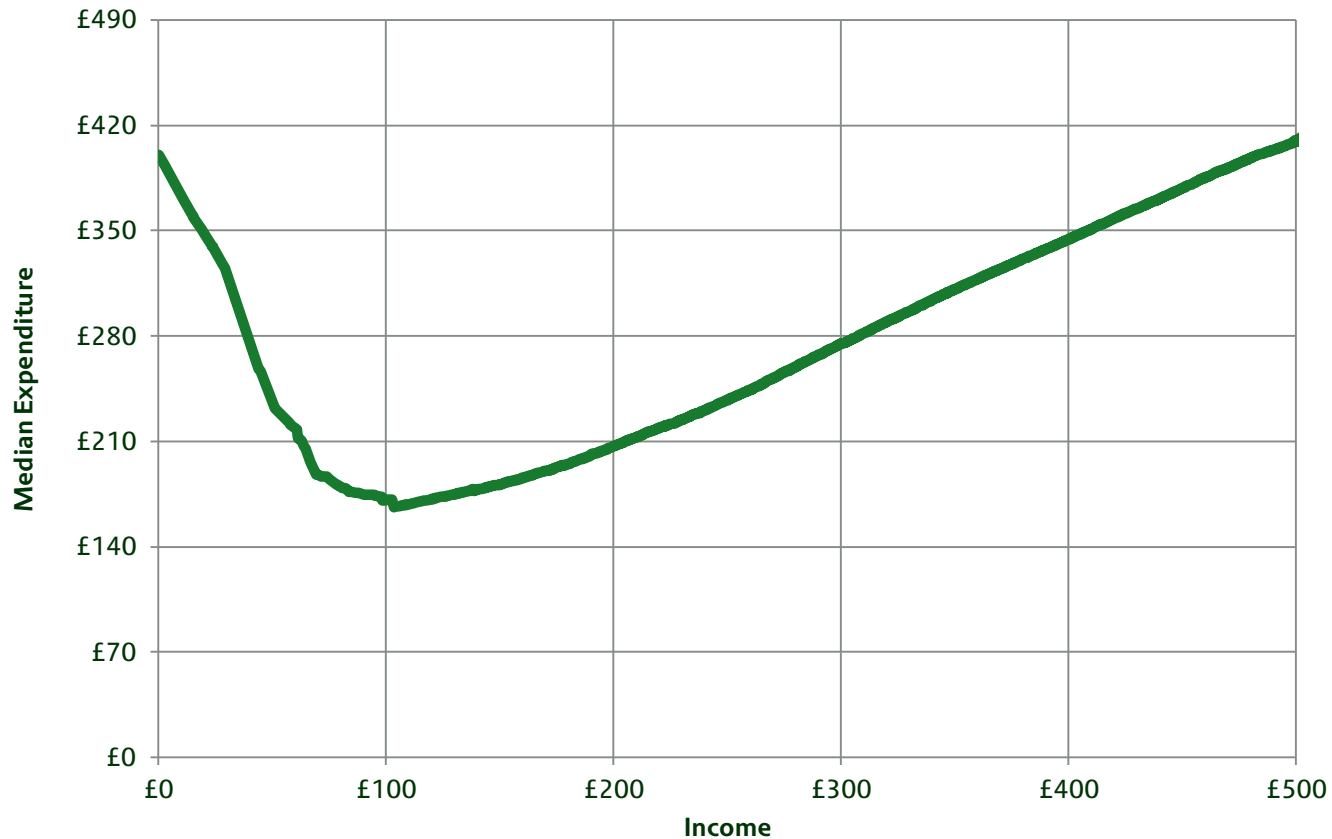
# Overview

- Measuring living standards
  - Why do we use income?
  - Accounting for inflation and family composition
- Income Inequality
  - The UK income distribution
  - Measures of income inequality
  - Growth in inequality in 1980s
  - Changes in inequality since 1990 – Belfield et al. (forthcoming)
- Summary

# Why income?

- Economic analysis tends to focus on income inequality and income poverty
  - not because income is the only thing that matters...
  - ...but because it is arguably the best measure of living standards we've got
- Consumption may be conceptually a better indicator of living standards
  - Income snapshots can be misleading
  - But it is difficult to measure...

# Those with the lowest incomes do not have the lowest consumption...

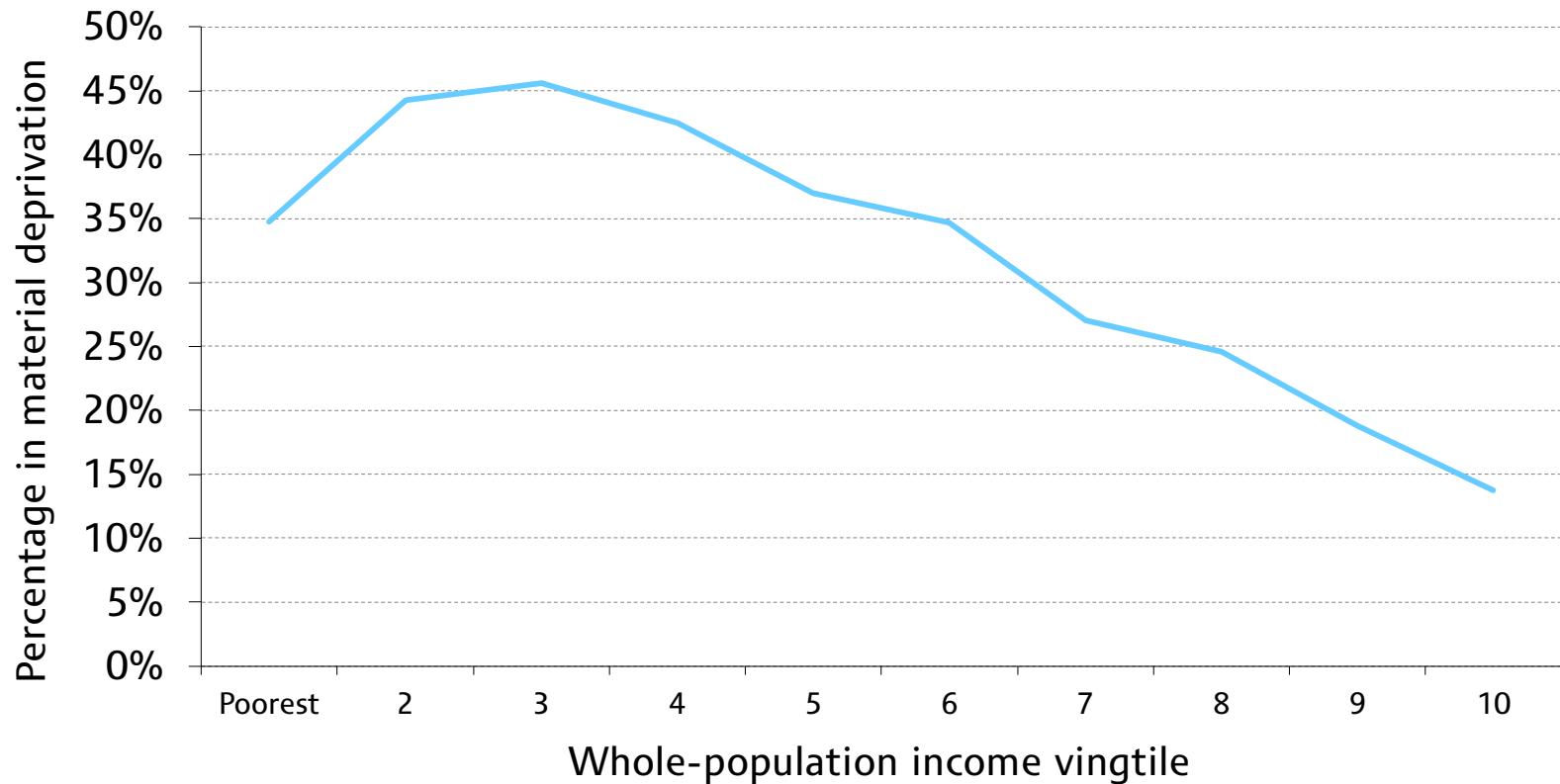


Source: Brewer and O'Dea (2012)

# Material Deprivation

- We can also look at another measure of hardship – material deprivation
- This is an indicator of families being unable to afford certain items
  - e.g a warm winter coat or to save £10 a month
- The answers to these questions are used to create a “deprivation score” out of 100
  - If more than 25 then classed as materially deprived
- Items that the majority of the population can afford are given more weight

# ... Nor are they most likely to be materially deprived



Source: Figure 5.7 of *Living Standards, Poverty and Inequality: 2015*

# Measurement of income

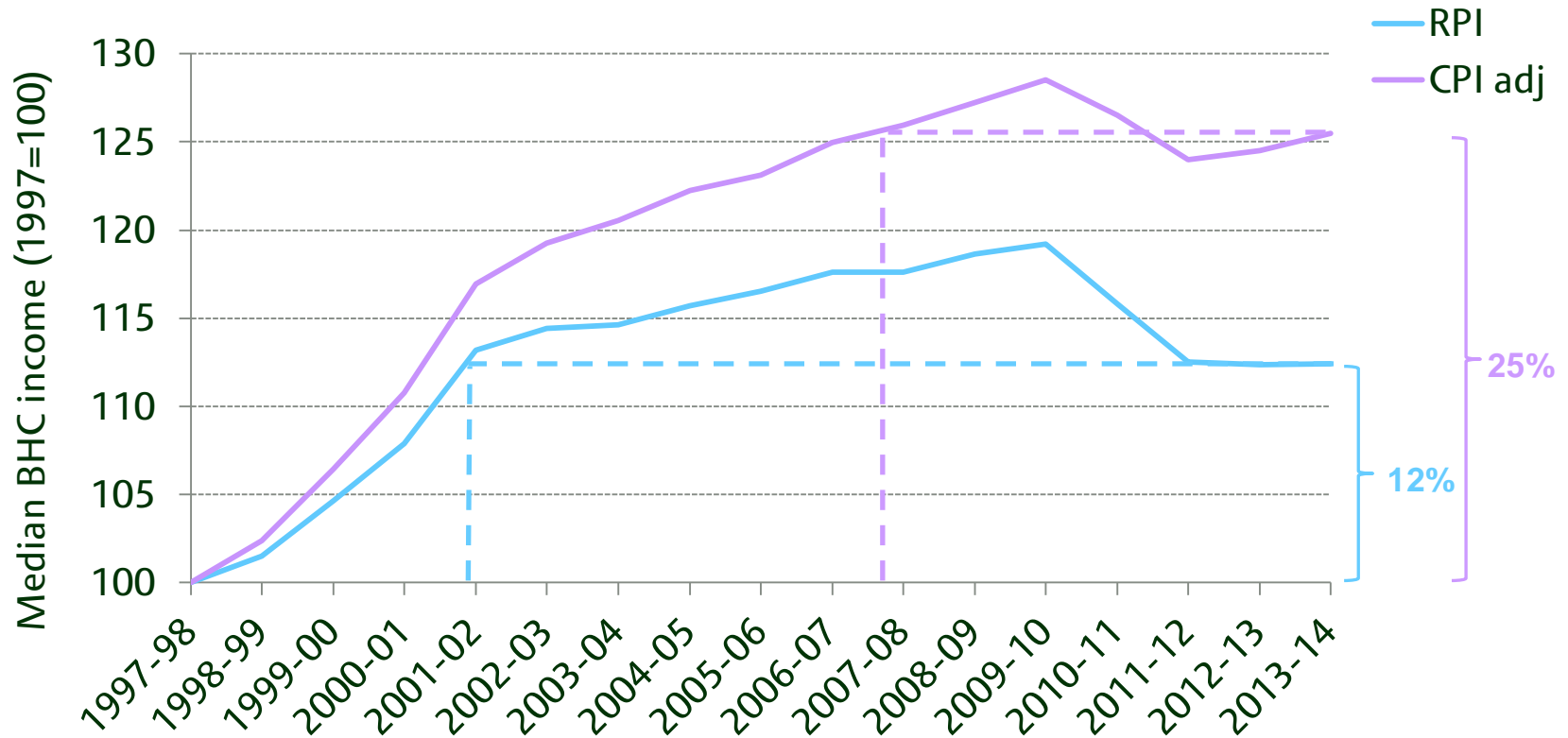
- Income as measured by government in “Households Below Average Income” (HBAI)
- Based on Family Resources Survey (from 1994-5 onwards)
  - 20,000 households across the UK
  - Subject to sampling error
- Income is measured net of direct taxes and benefits
- Measured at the household level (implicitly assumes income sharing)
- Adjusted for inflation

# RPI and its problems

- In the official statistics RPI is used to account for inflation over time
- However recently RPI has been thought to overstate inflation due to a “formula effect”
  - Given the same price changes the RPI methodology will measure inflation to be around 1% higher than CPI
- It has been declassified as an official statistic
- An alternatives include RPIJ and CPIH...
- ...but we use a variant of CPI we constructed ourselves



# Adjusting for inflation

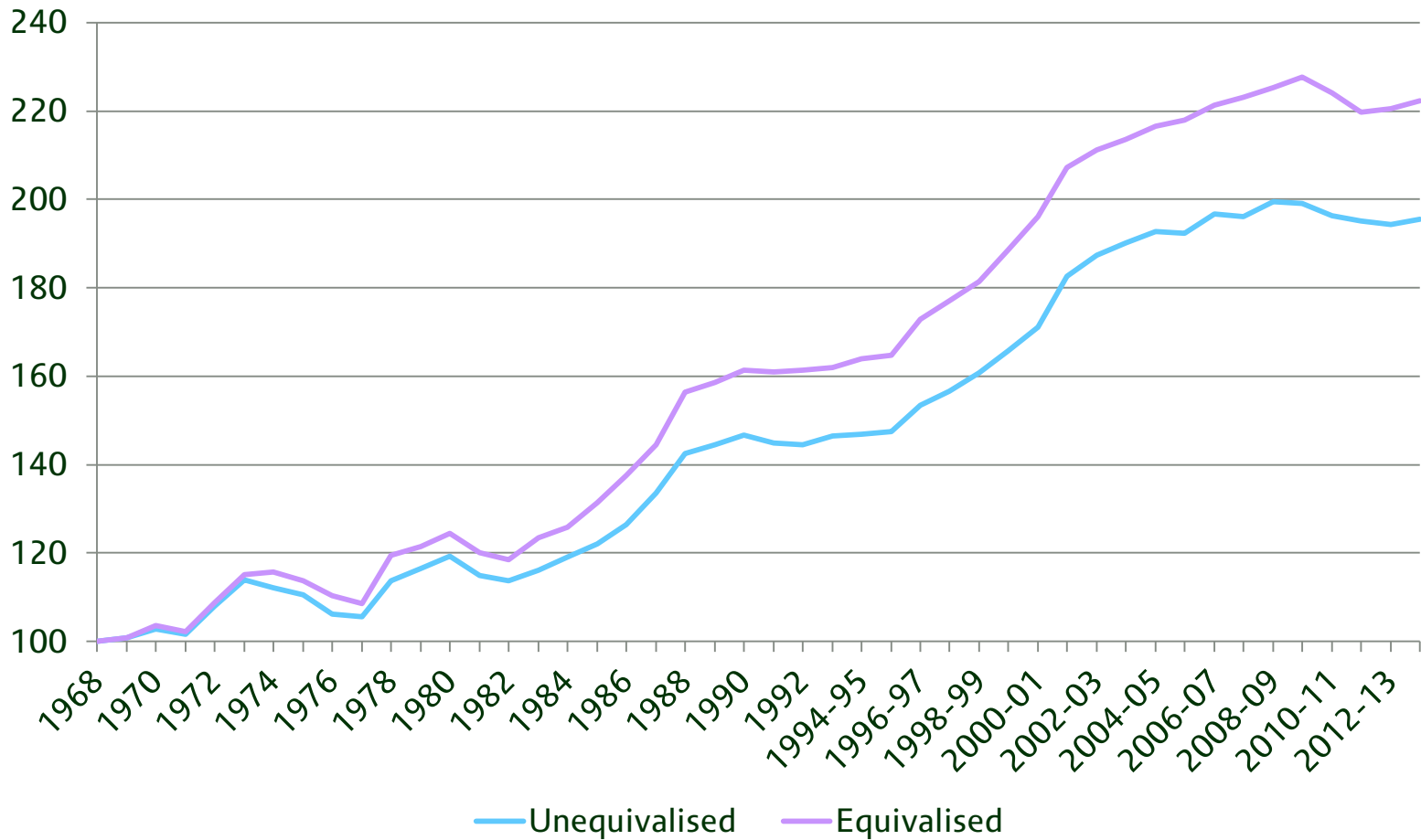


Notes: The RPI line is in fact RPI minus council tax, the inflation measure currently used to adjust HBAI incomes

# Measurement of income

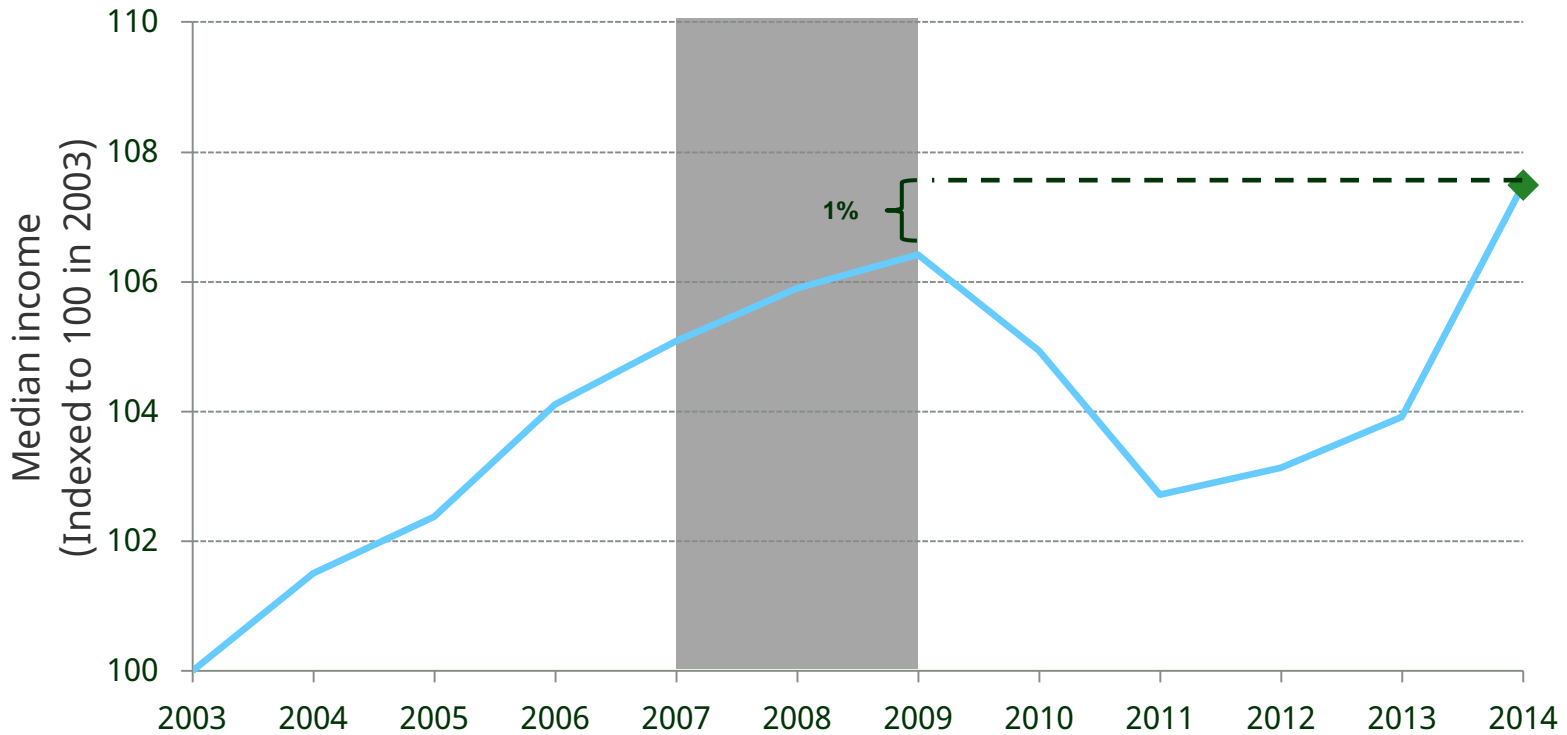
- Income as measured by government in “Households Below Average Income” (HBAI)
- Based on Family Resources Survey (from 1994-5 onwards)
  - 25,000 households across the UK
  - Subject to sampling error
- Income is measured net of direct taxes and benefits
- Measured at the household level (implicitly assumes income sharing)
- Adjusted for inflation
- Adjusted for household size (equivalised)

# Adjusting for household size



Source: FRS data years 1968 to 2013-14

# Median income since 2003-04

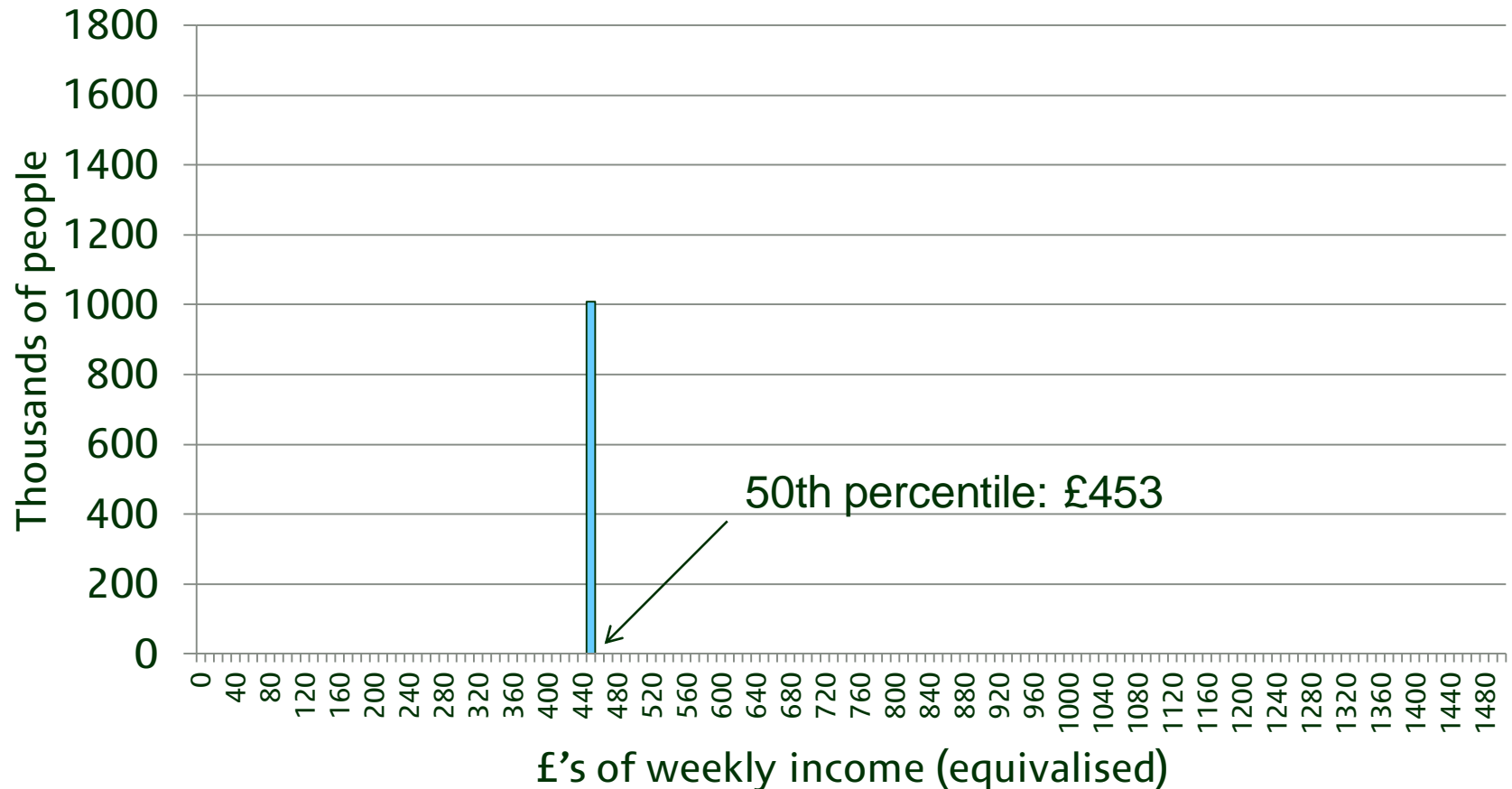


Source: Figure 2.3 of *Living Standards, Poverty and Inequality: 2016*

# Income inequality

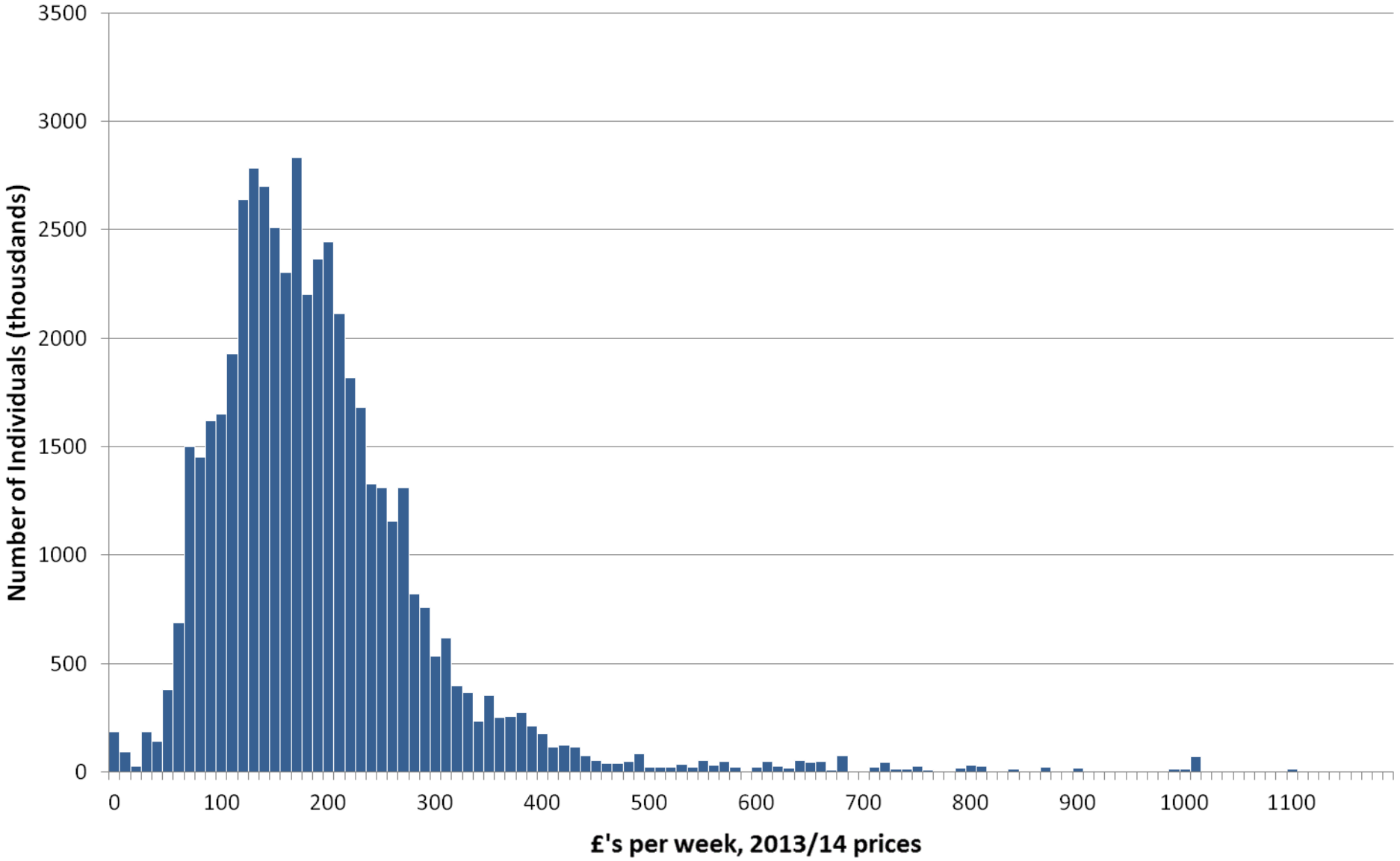


# The UK income distribution in 2013–14

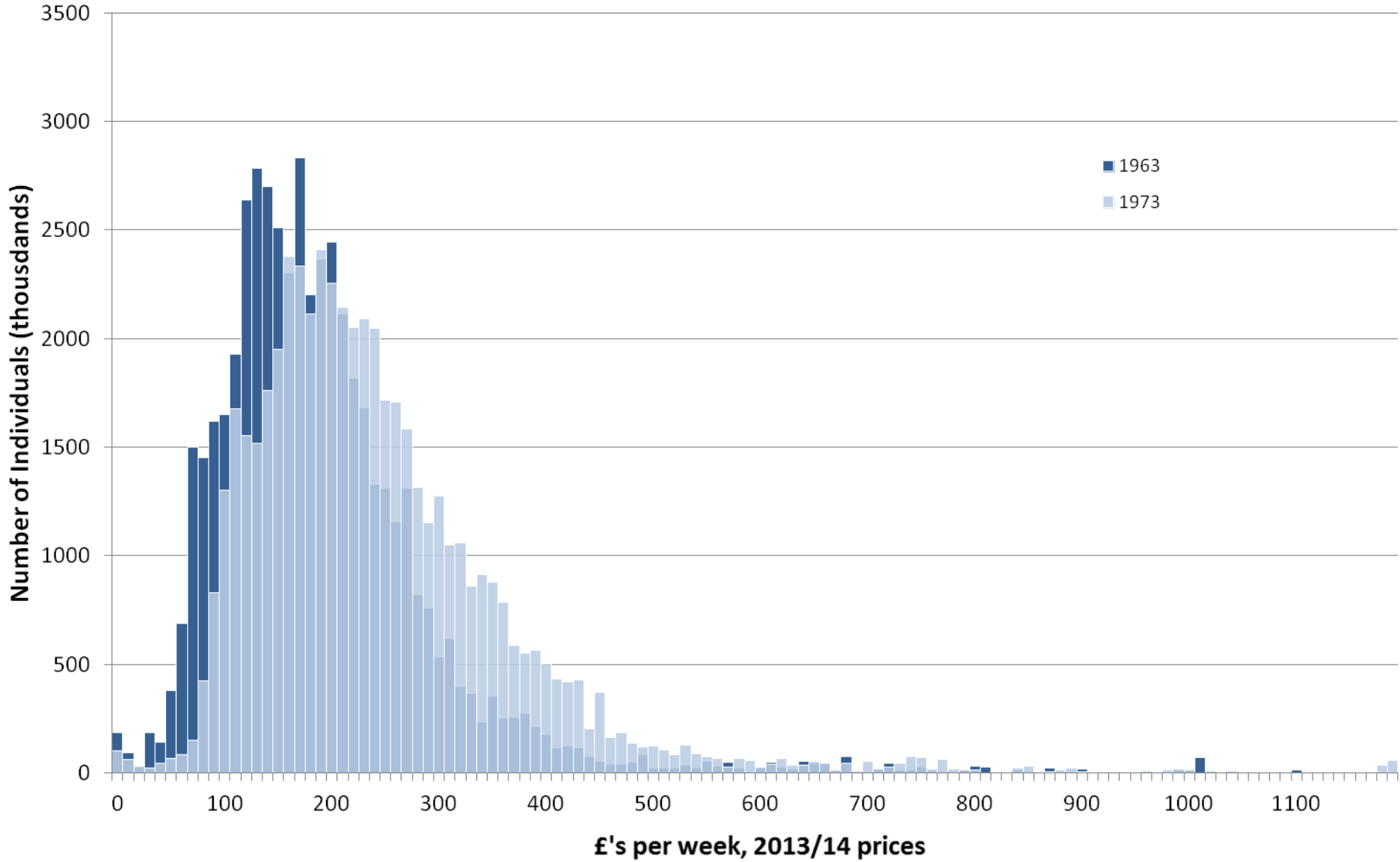


Source: Figure 3.1 of *Living Standards, Poverty and Inequality: 2014*

# Income distribution: 1963

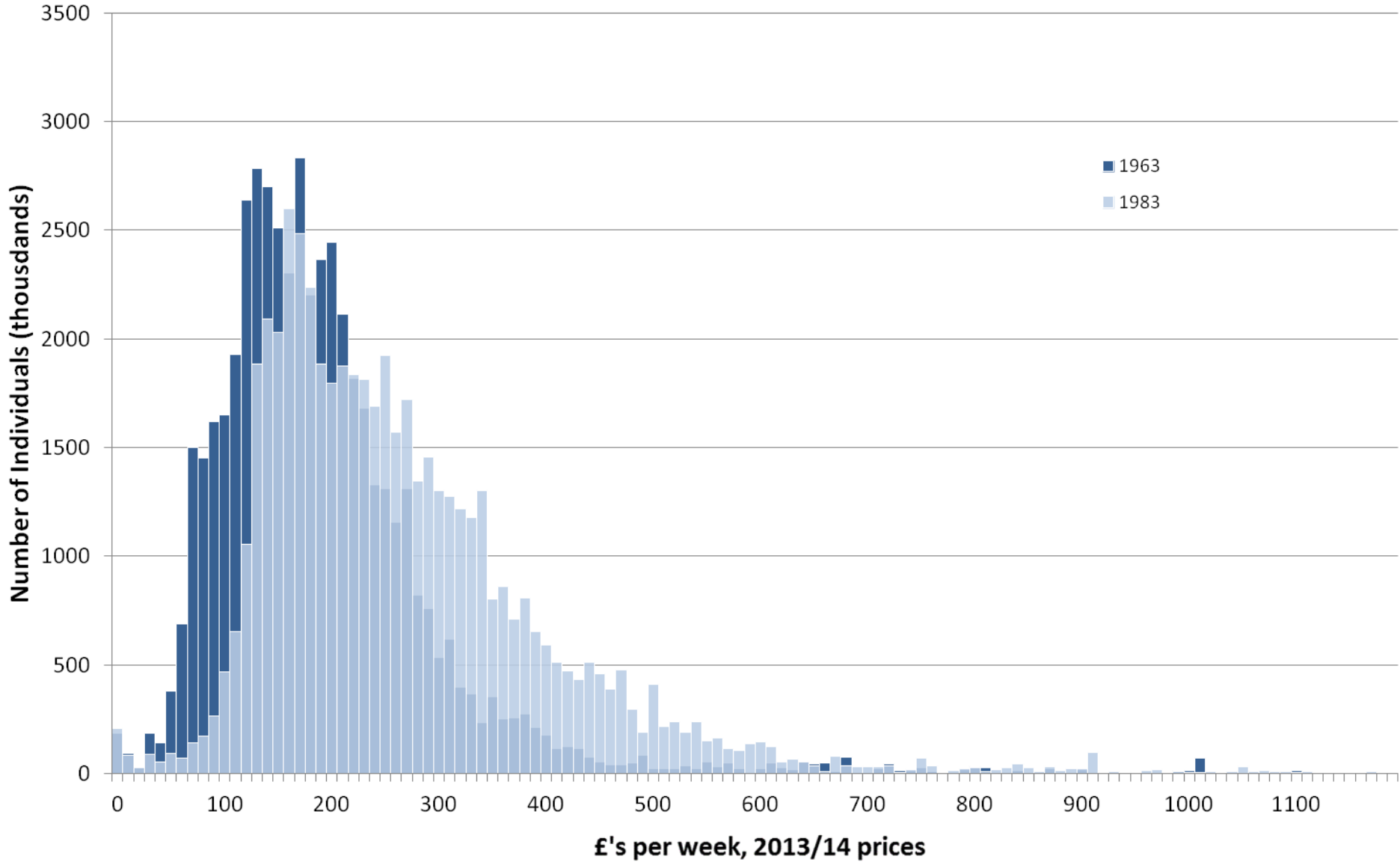


# Income distribution: 1963 - 1973

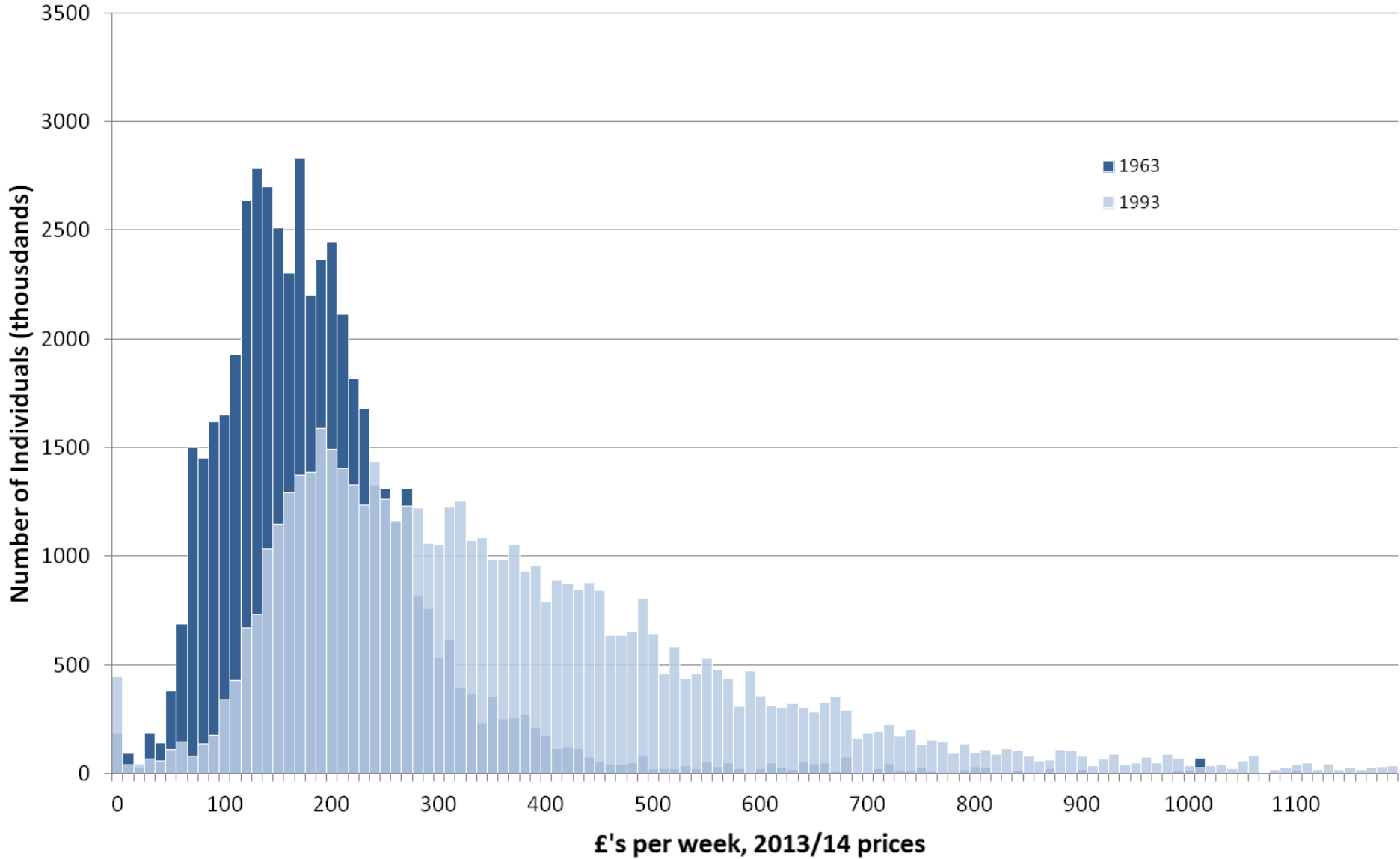




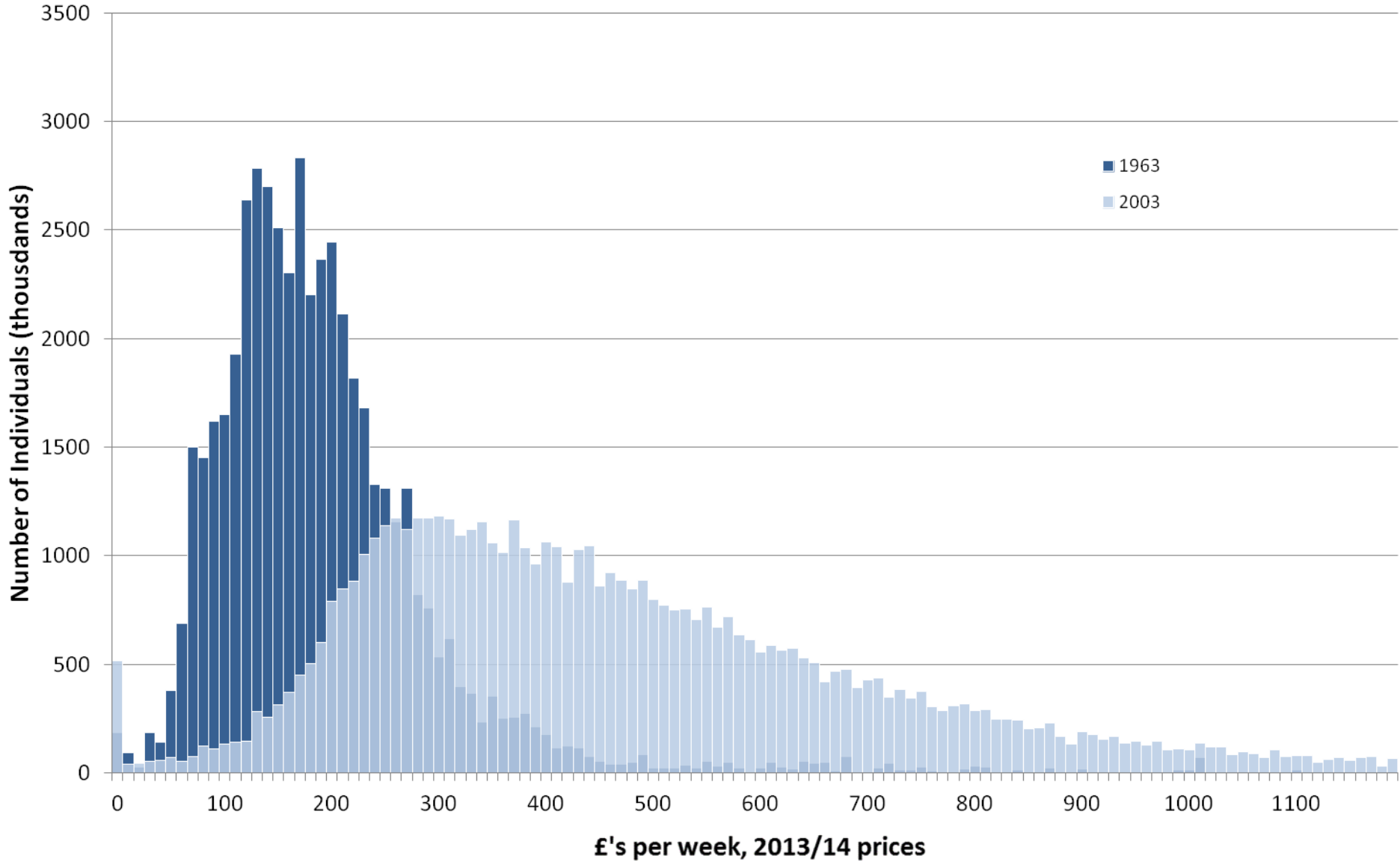
# Income distribution: 1963 - 1983



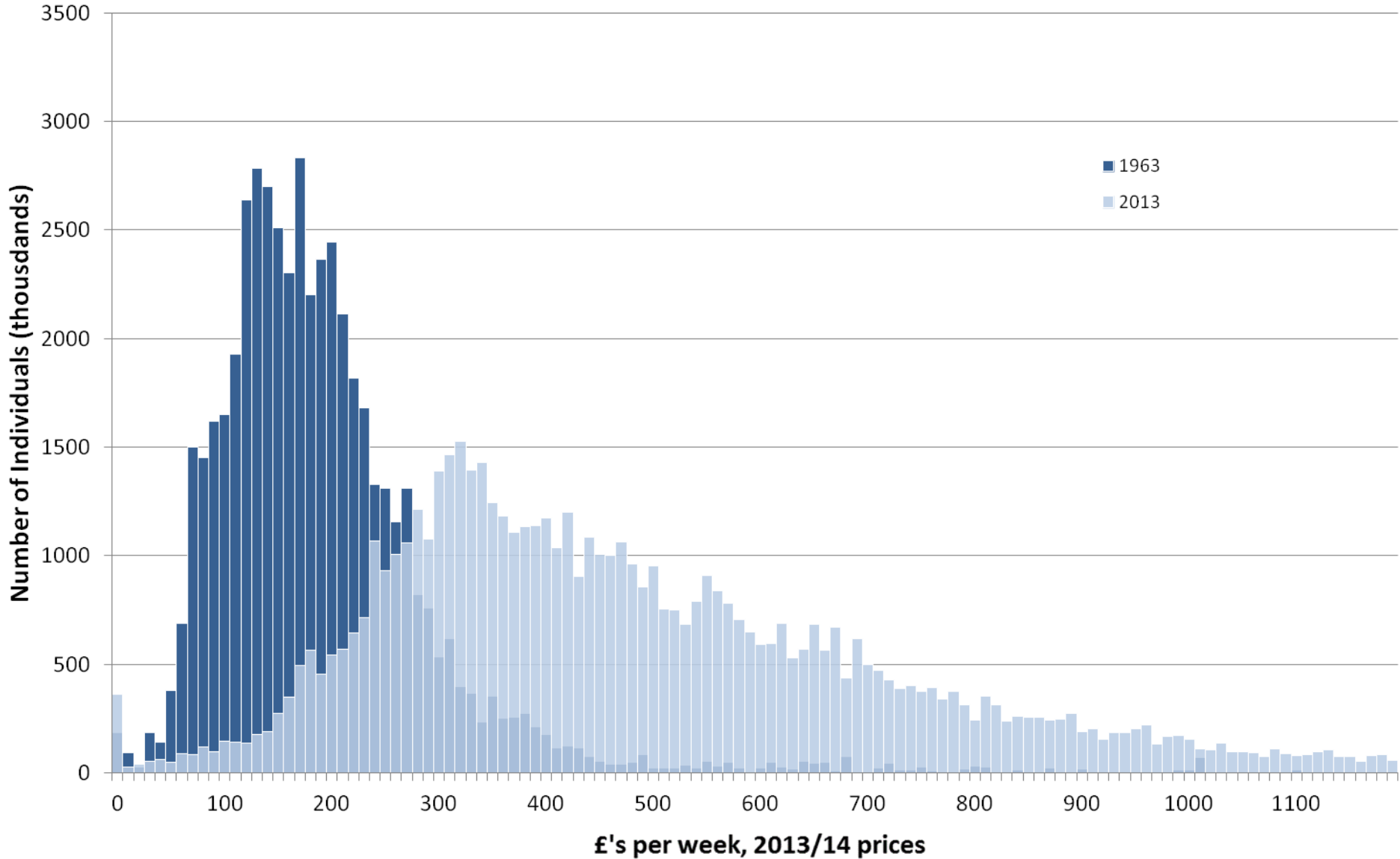
# Income distribution: 1963 - 1993



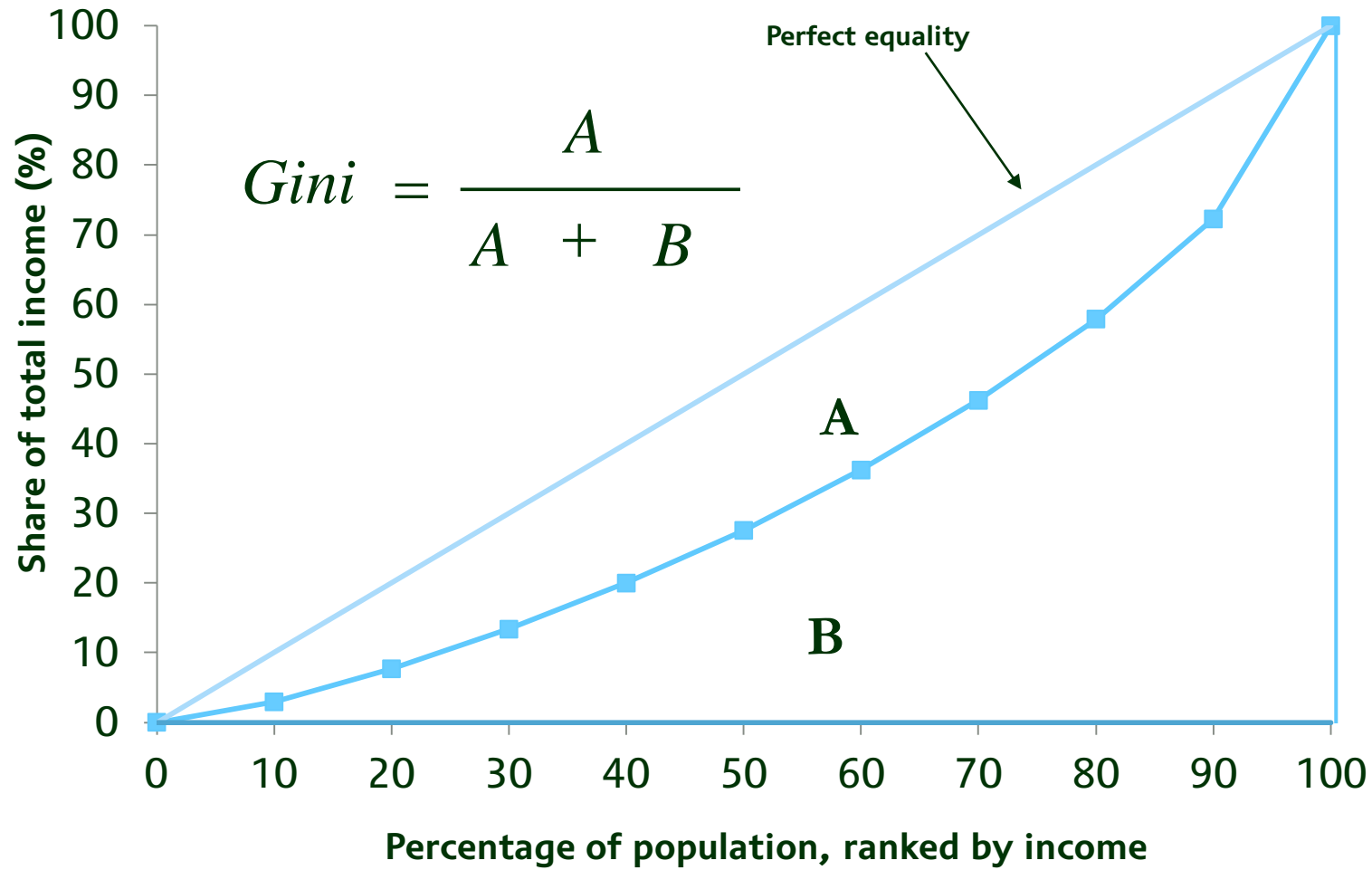
# Income distribution: 1963 - 2003



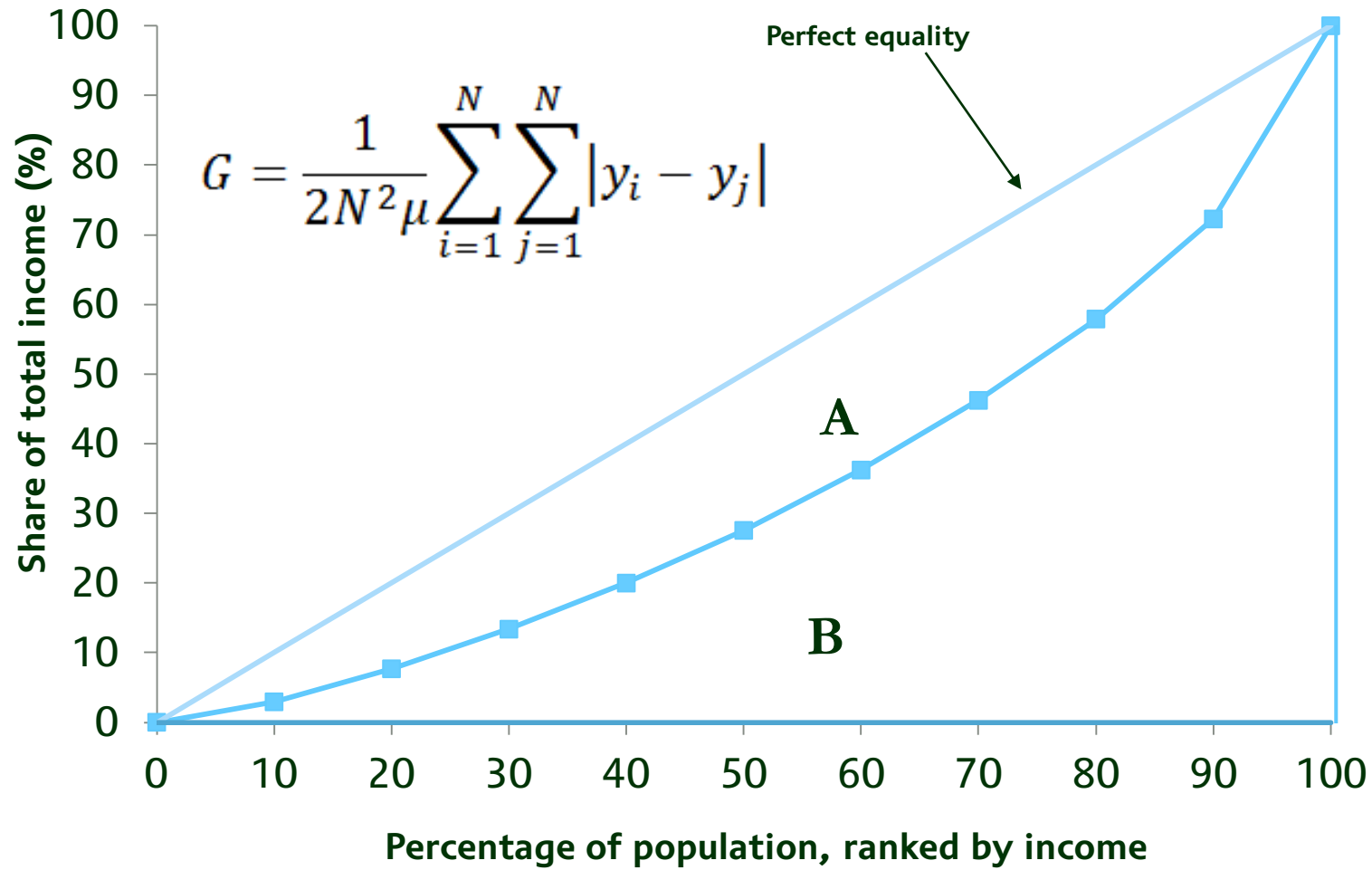
# Income distribution: 1963 - 2013



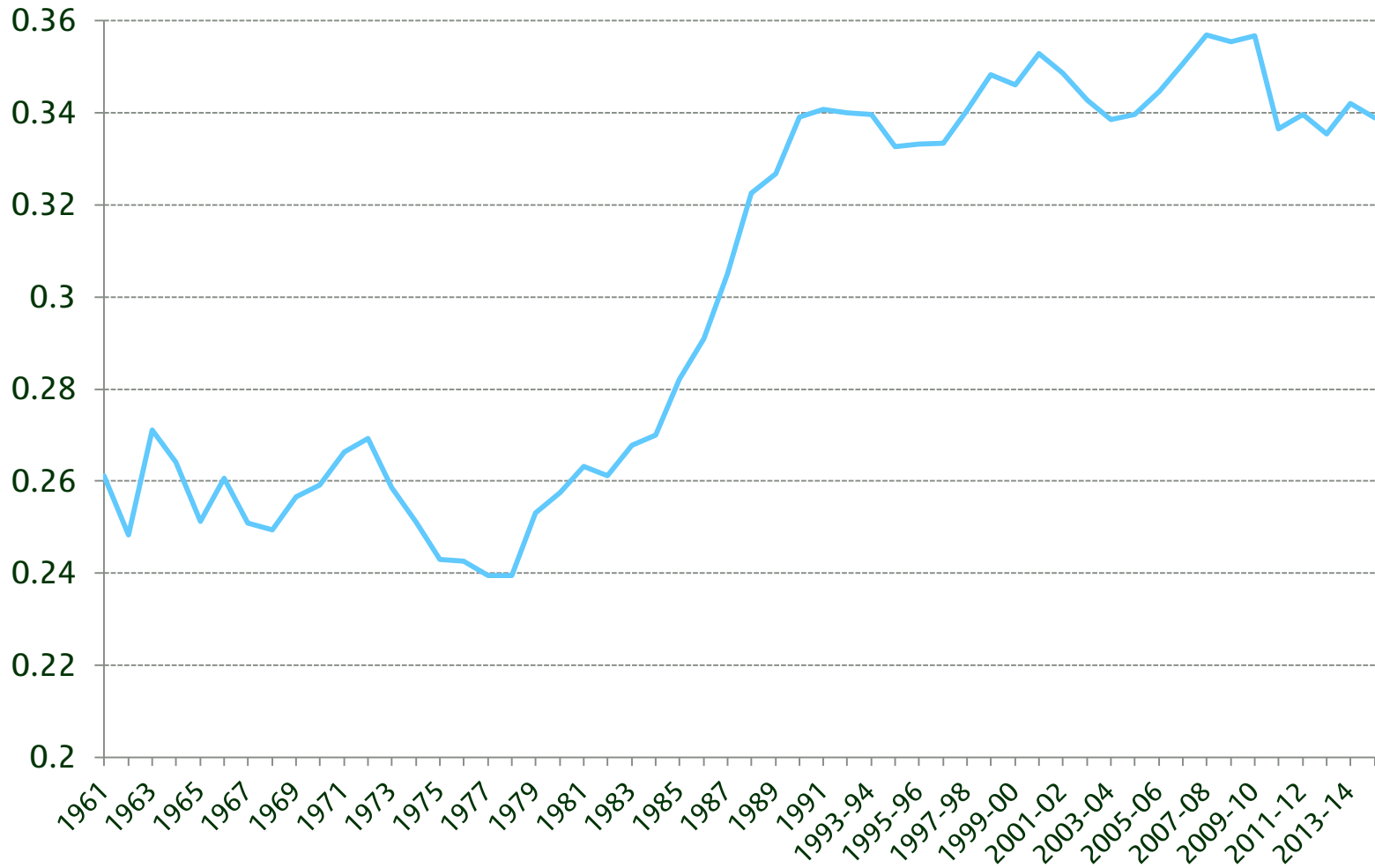
# Measuring income inequality: the Gini coefficient



# Measuring income inequality: the Gini coefficient



# Gini coefficient: 1961 to 2014–15



# Why did income inequality rise in the 1980s?

- Lots of explanations
  - Skills-biased technological changes [see Acemoglu (2002), Machin (2001) and Goldin and Katz (2008)]
  - Labour market institutions: weaker trade unions and a decline of collective bargaining (Goodman and Shephard 2002)



# Impact of trade unions on inequality

- Quantile regression and Chamberlain (1994)

# Quantile regression

- OLS minimises the SQUARED errors:

$$\min_b \frac{1}{n} \sum_{i=1}^n (y_i - x_i b)^2$$

- Median regression minimises ABSOLUTE errors:

$$\min_b E [|Y - Xb|].$$

- Quantile regression minimises the CHECK function:

$$\min_b E [\tau (Y - Xb) \cdot 1 [Y - Xb \geq 0] - (1 - \tau) (Y - Xb) \cdot 1 [Y - Xb < 0] | x]$$

# Impact of trade unions on inequality

- Quantile regression and Chamberlain (1994)

$$\ln(Wages_i) = \beta_0 + \beta_1 Trade\_Union_i + X_i' \beta_j + u_i$$

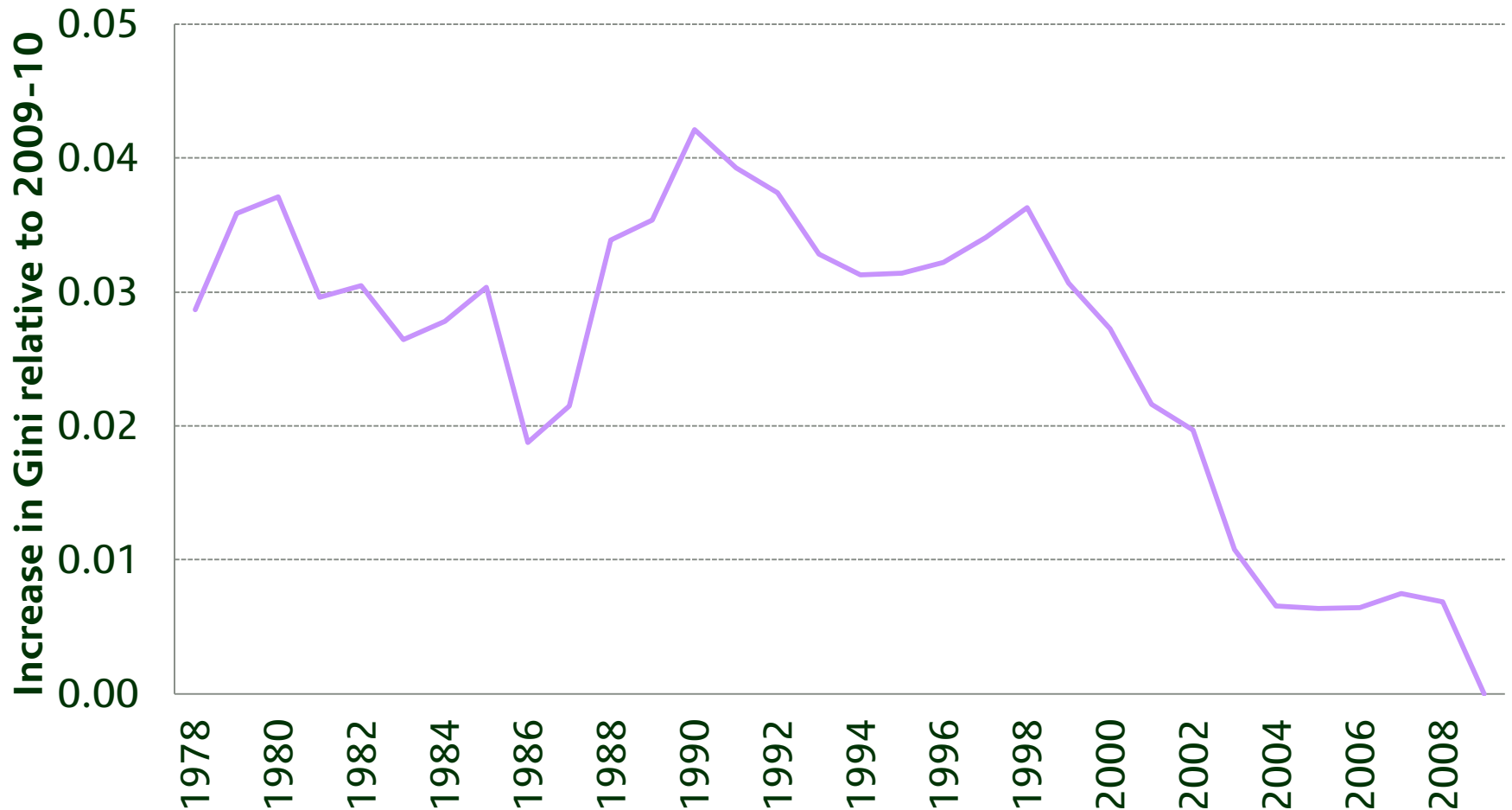
Sector	0.1	0.25	0.5	0.75	0.9	OLS
Manufacturing	0.281 ( 0.12 )	0.249 ( 0.12 )	0.169 ( 0.11 )	0.075 ( 0.1 )	-0.003 ( 0.11 )	0.158 ( 0.14 )
Non-manufacturing	0.47 ( 0.14 )	0.406 ( 0.14 )	0.333 ( 0.13 )	0.248 ( 0.16 )	0.184 ( 0.18 )	0.327 ( 0.16 )

# Why did income inequality rise in the 1980s?

- Lots of explanations
  - Skills-biased technological changes [see Acemoglu (2002), Machin (2001) and Goldin and Katz (2008)]
  - Labour market institutions: weaker trade unions and a decline of collective bargaining (Goodman and Shephard 2002)
  - More inequality in employment status across households (Gregg and Wadsworth, 2008)
  - Changes in the tax and benefit system

# Impact of tax and benefit system

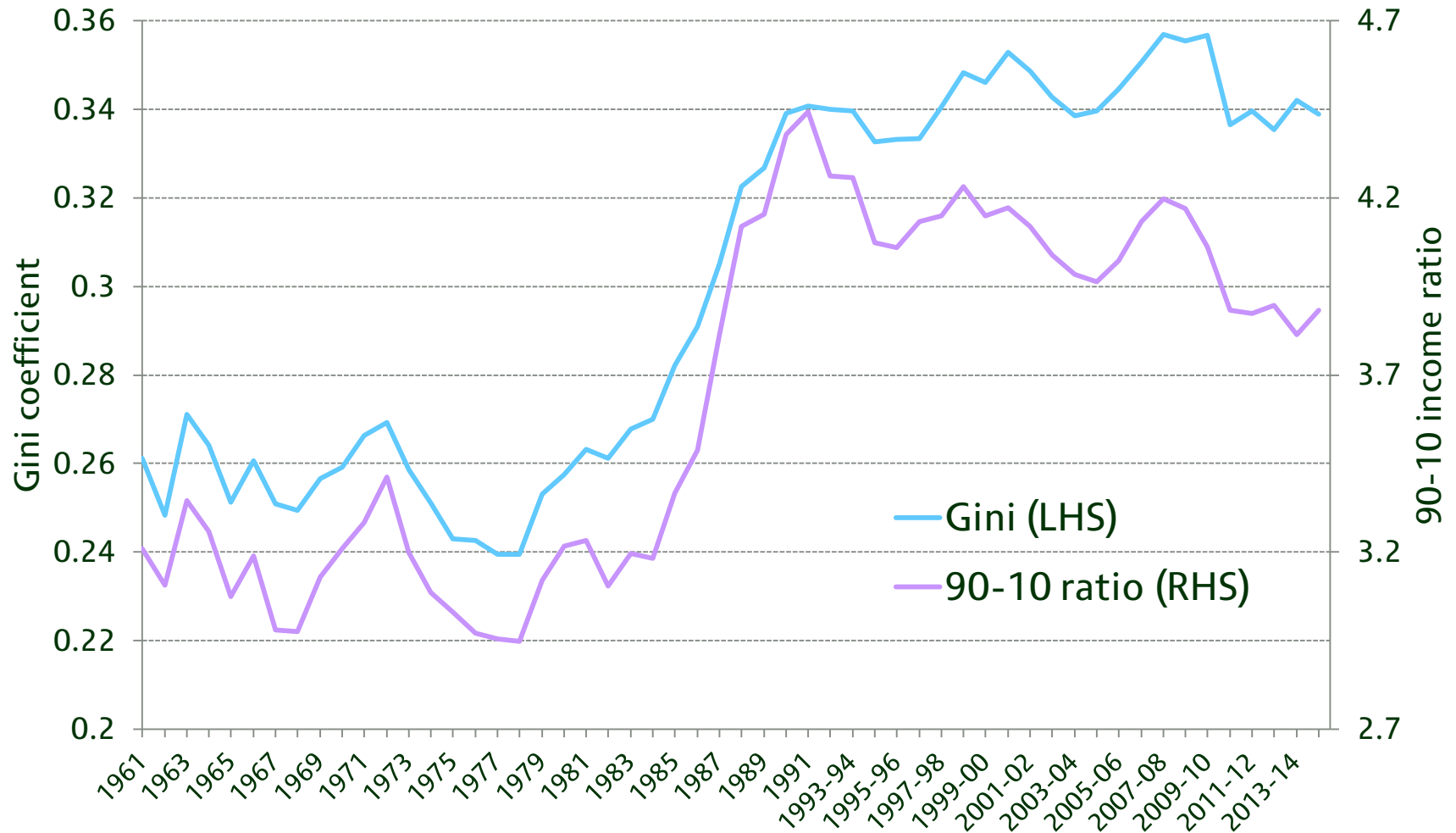
## Increase in Gini relative to 2009-10



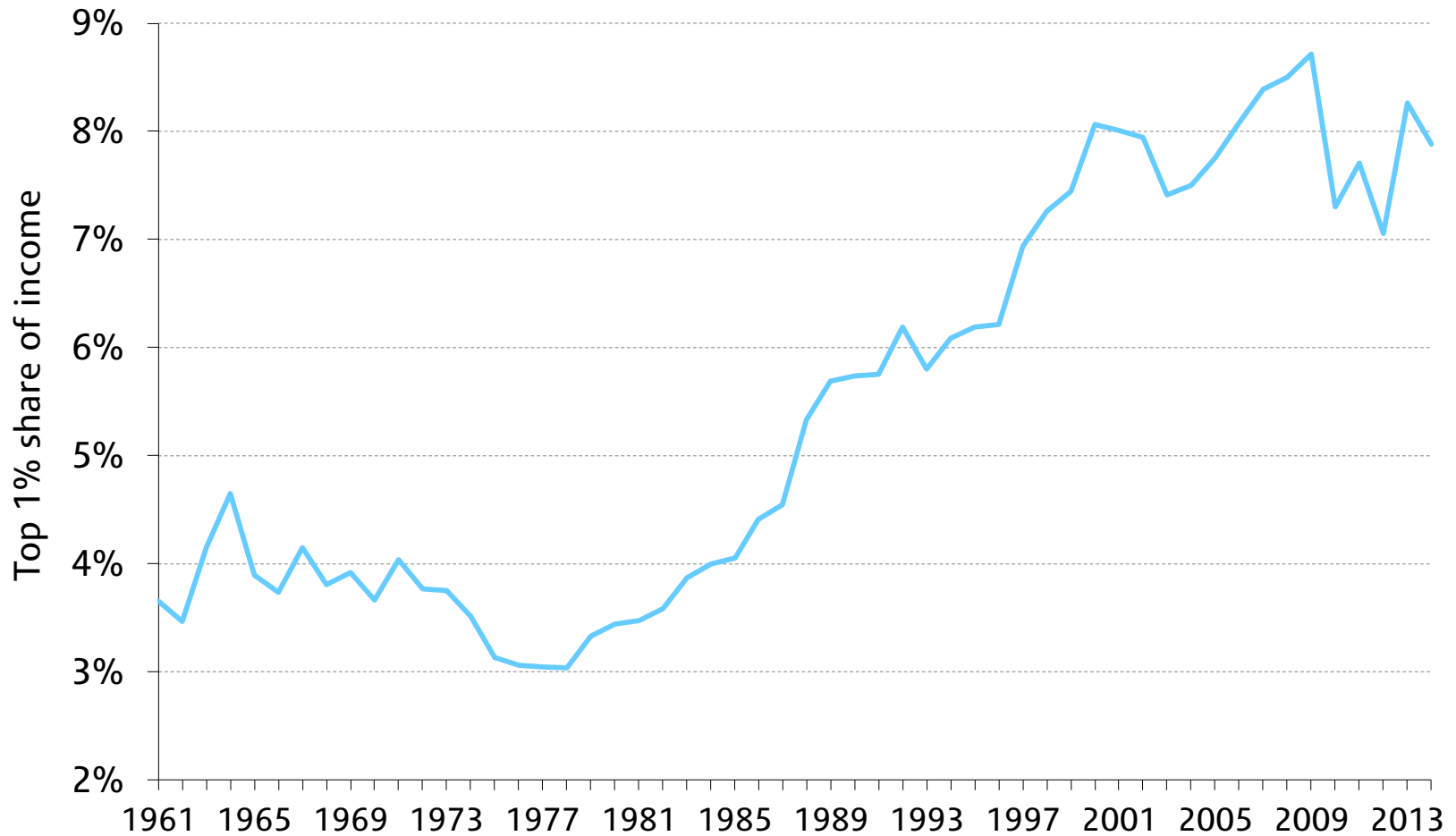
Source: Adam and Browne (2010).

Note: Tax and benefit systems from previous years have been uprated in line with the Retail Prices Index. Years up to and including 1992 are calendar years; thereafter, years refer to financial years.

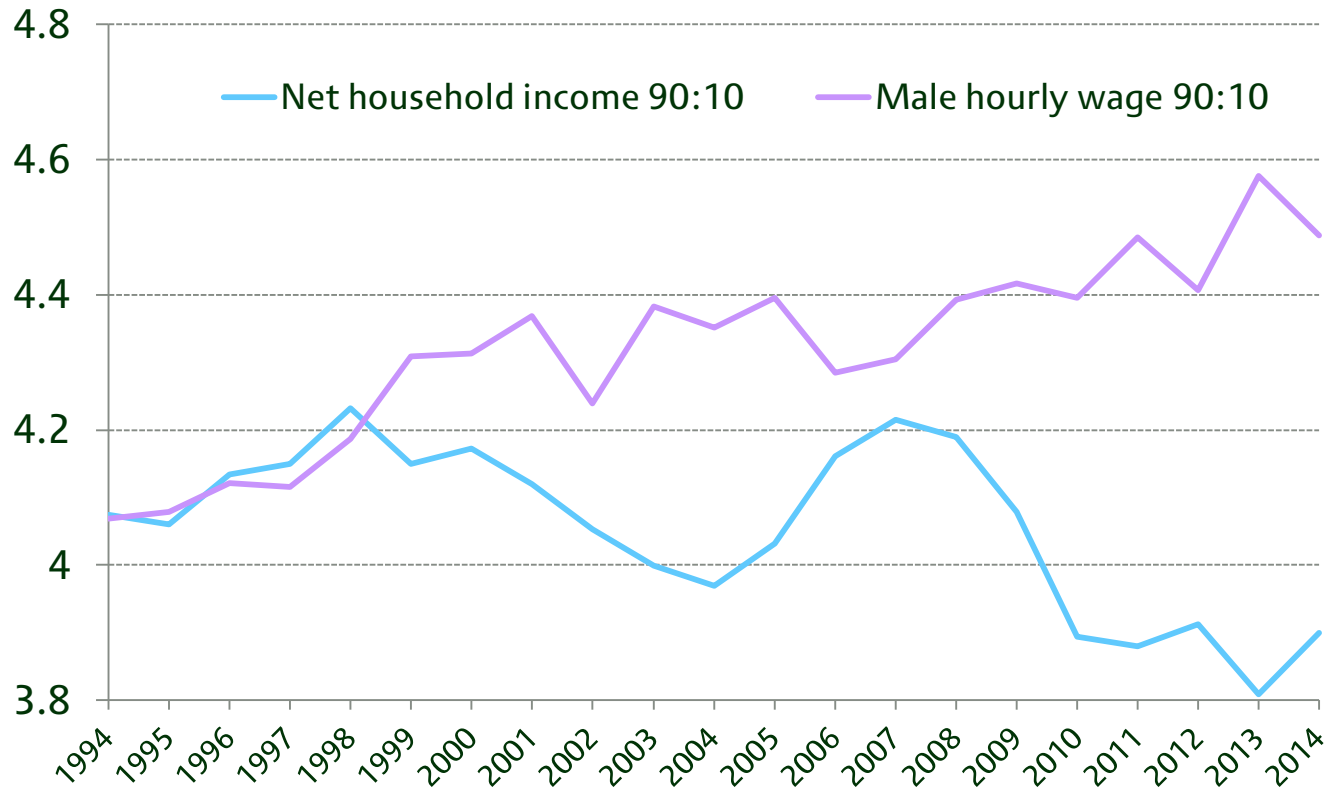
# Gini coefficient: 1961 to 2014–15



# Income share of top 1%



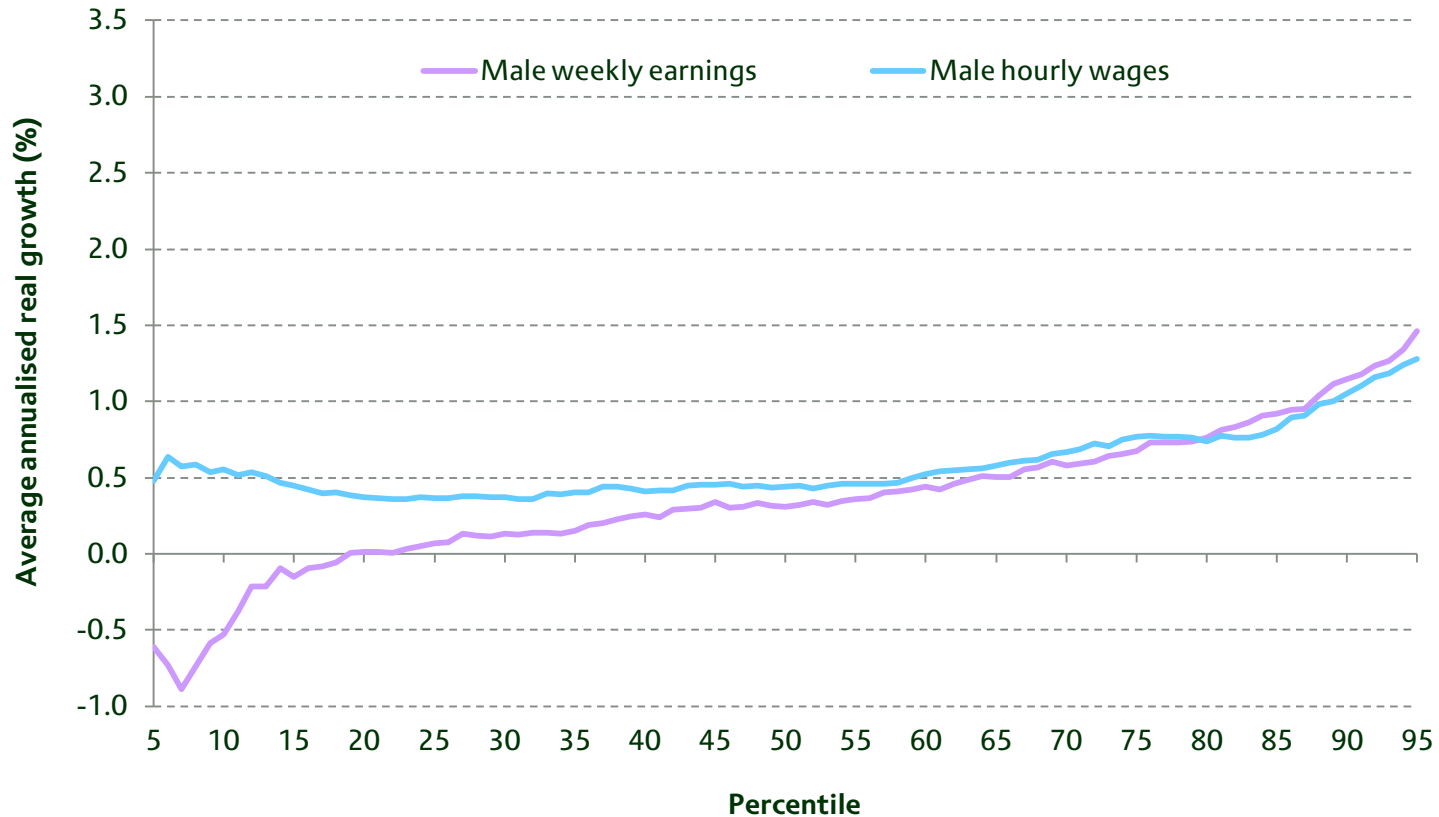
# Inequality in the UK since 1990



Source: Figure 4 *Belfield et al. (forthcoming)*

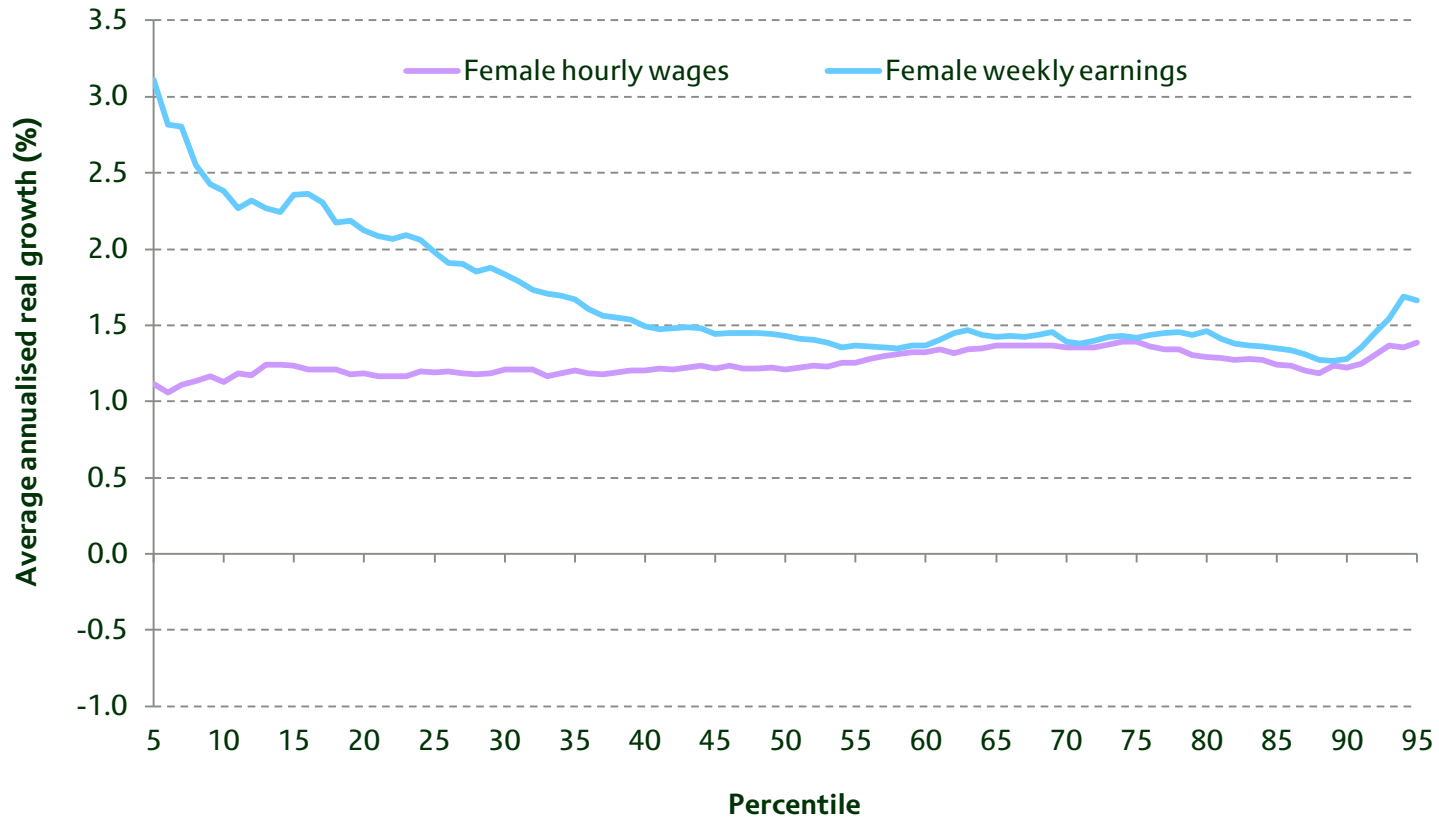


# Male earnings inequality



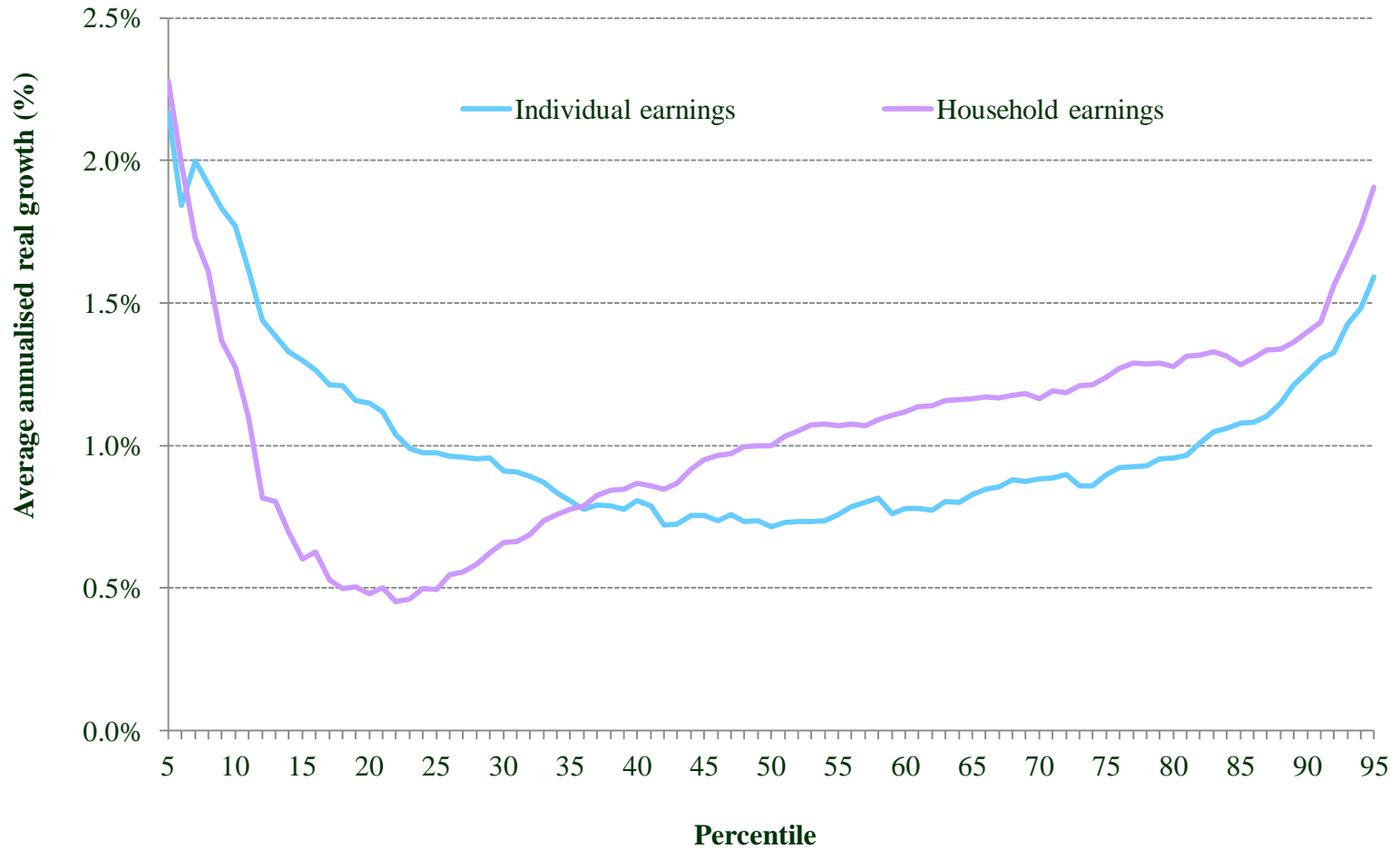
Source: Figure 5 *Belfield et al. (forthcoming)*

# Female earnings inequality



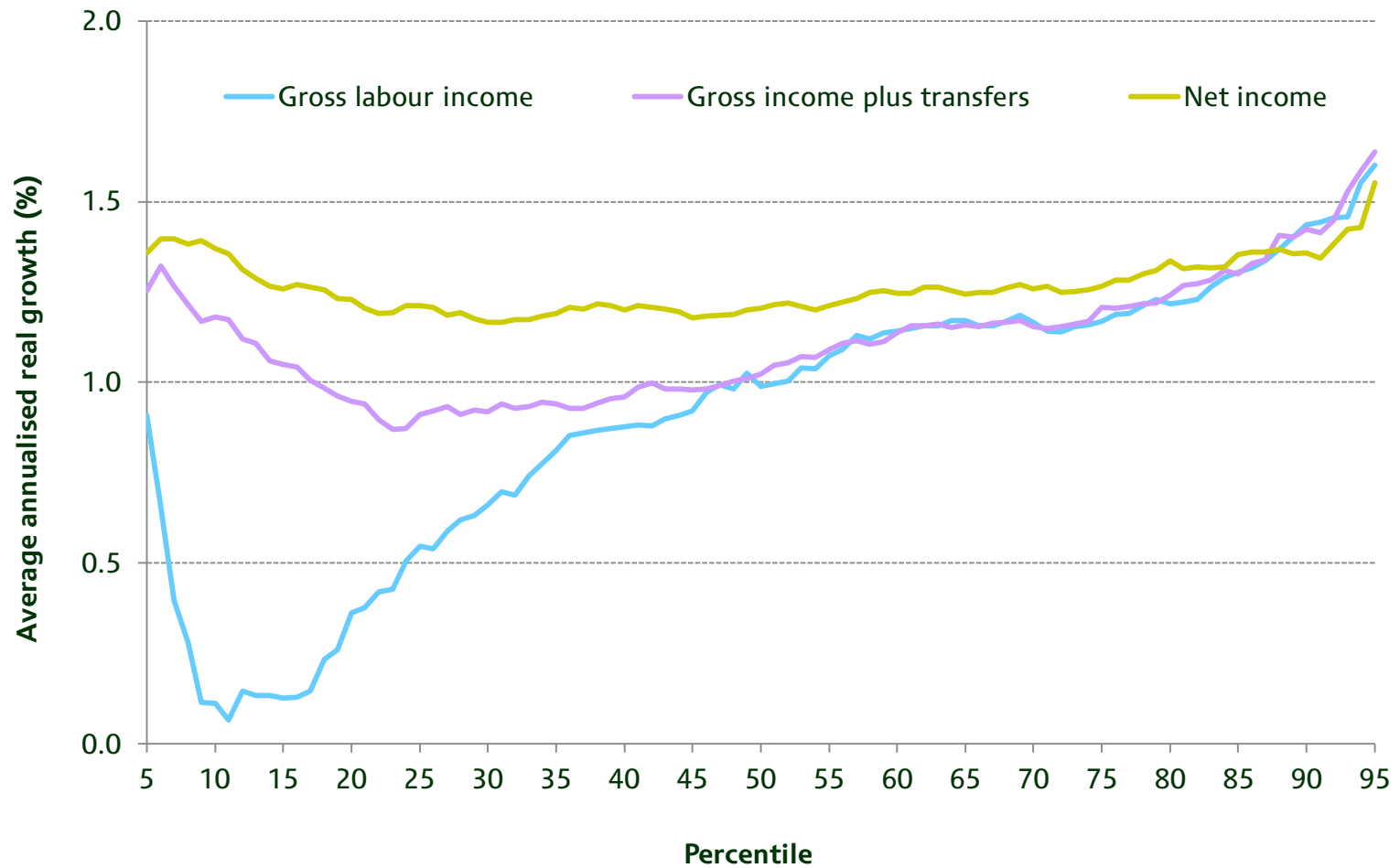
Source: Figure 5 *Belfield et al. (forthcoming)*

# Individual and household earnings



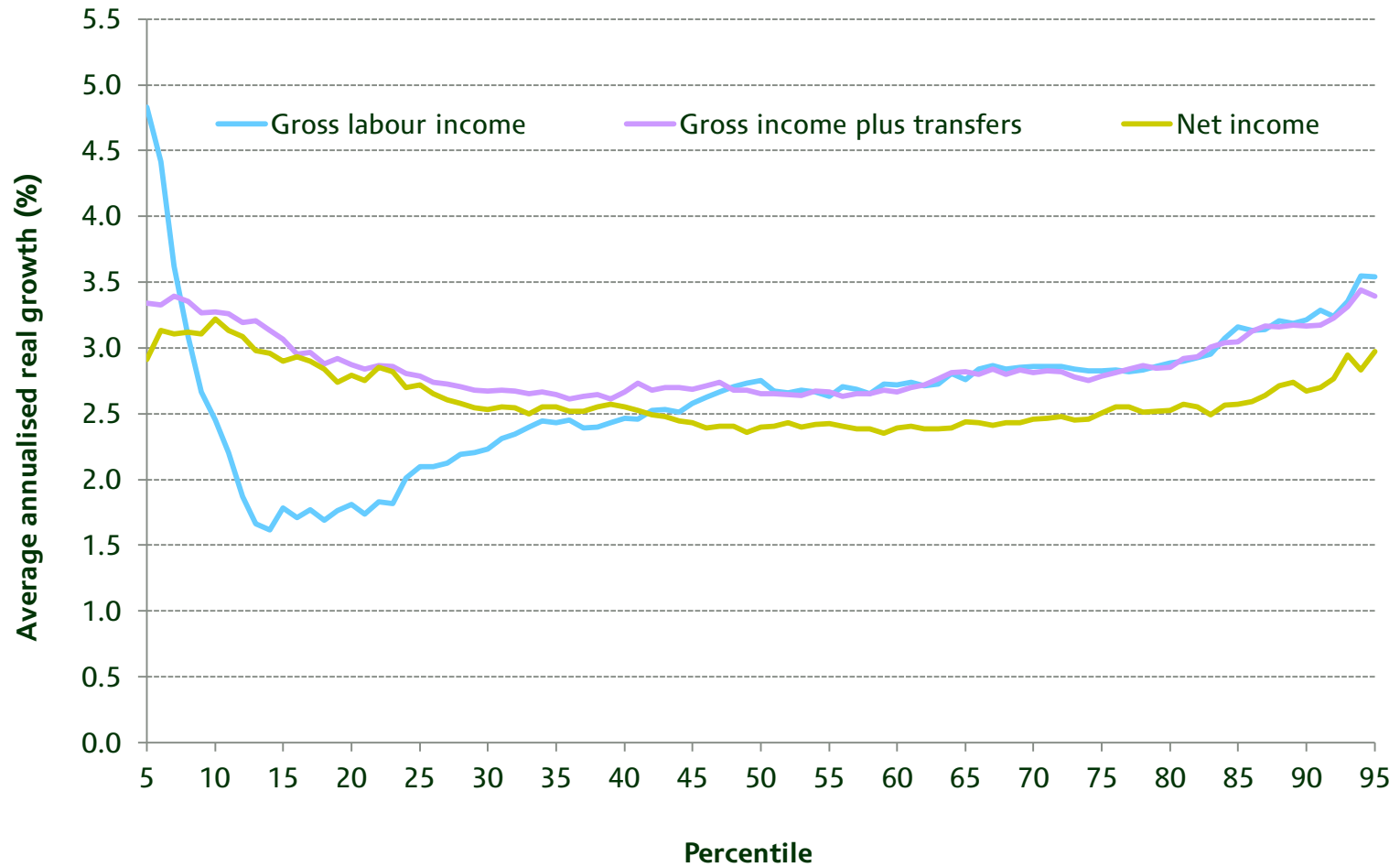
Source: Authors calculations using FRS

# Earnings to income for working households



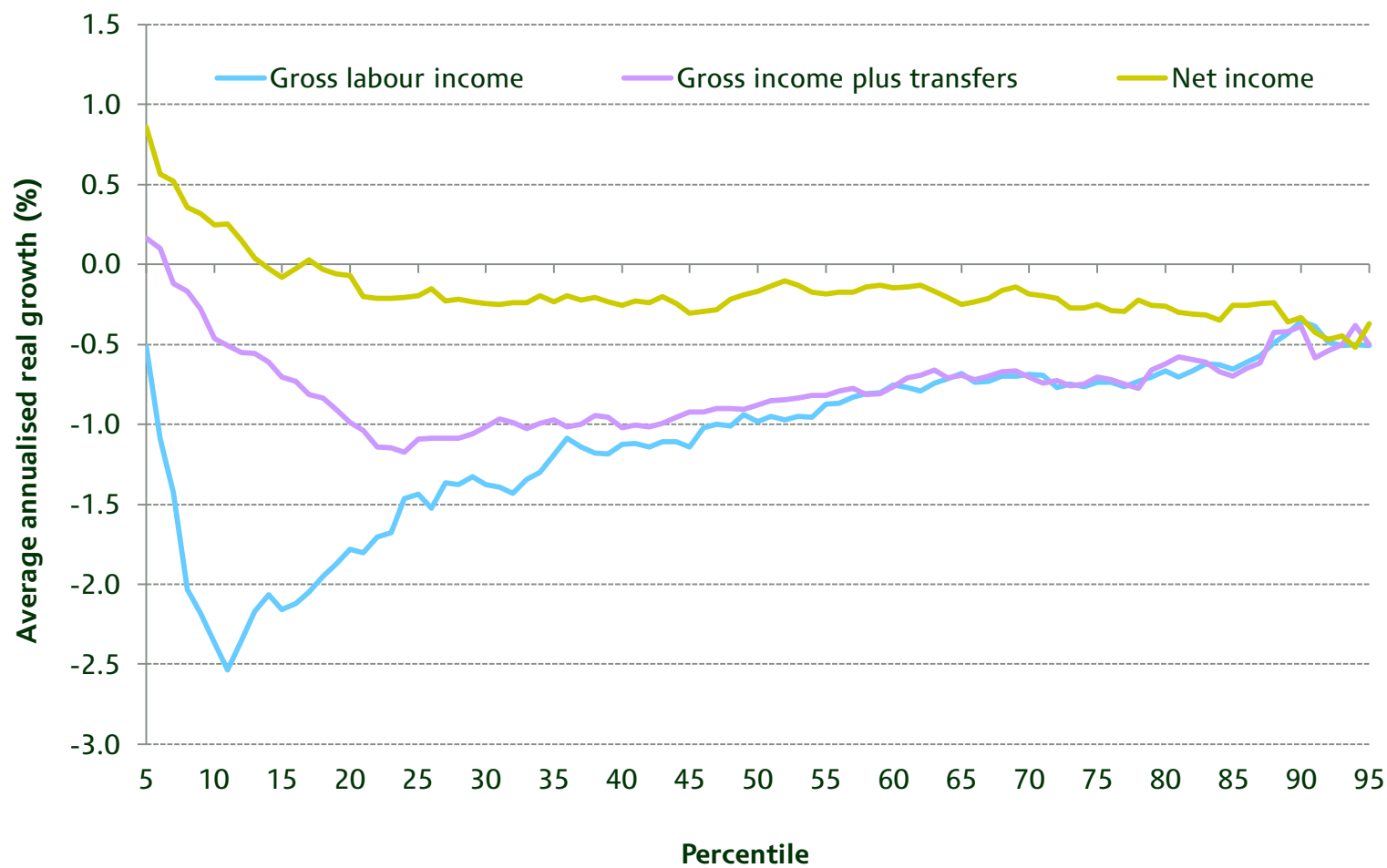
Source: Figure 7a Belfield et al. (forthcoming)

# Earnings to income: 1997-2004 - Discretionary benefit increases



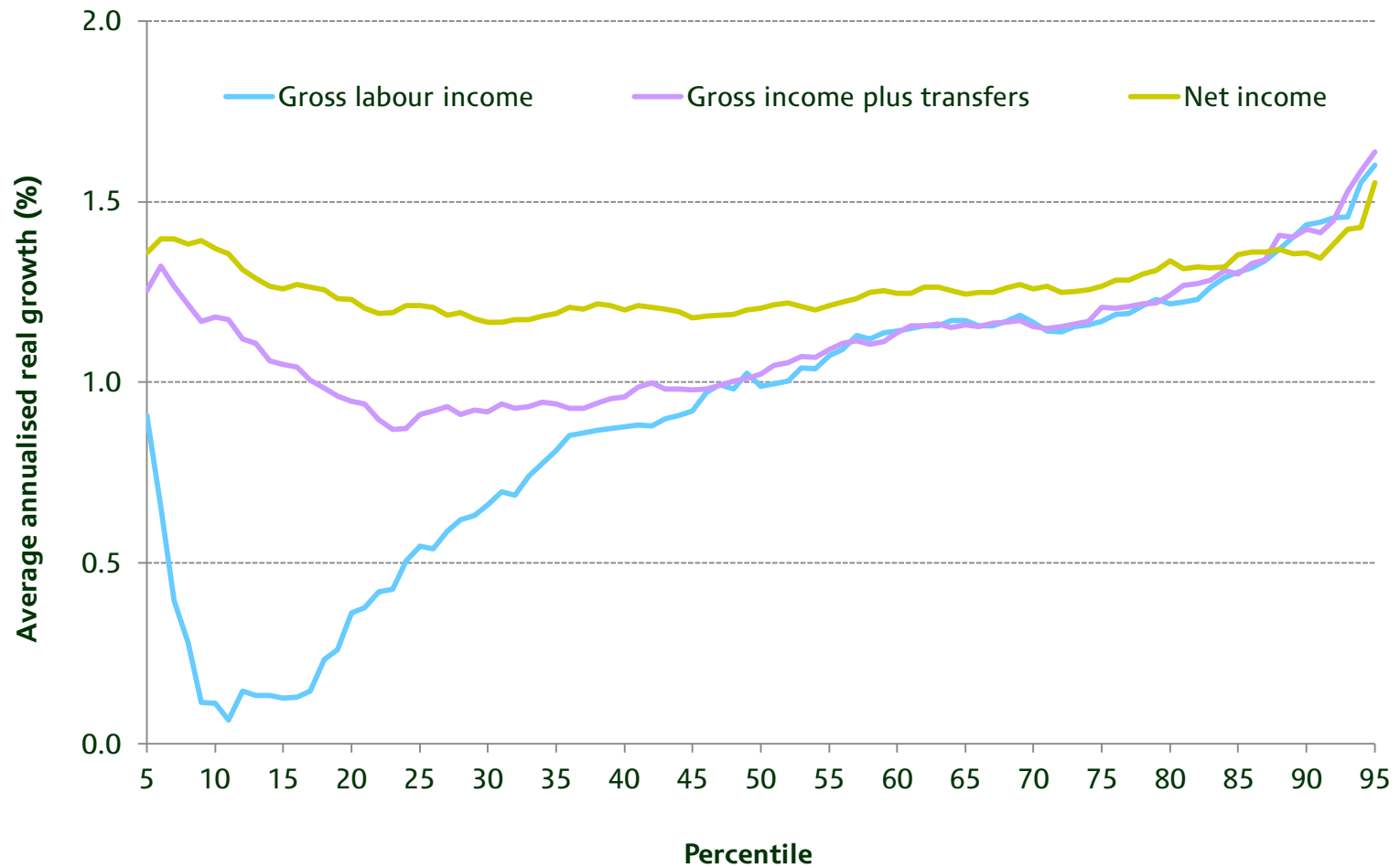
Source: Figure 7b Belfield et al. (forthcoming)

# Earnings to income: 2007-2014 – Automatic stabilisers



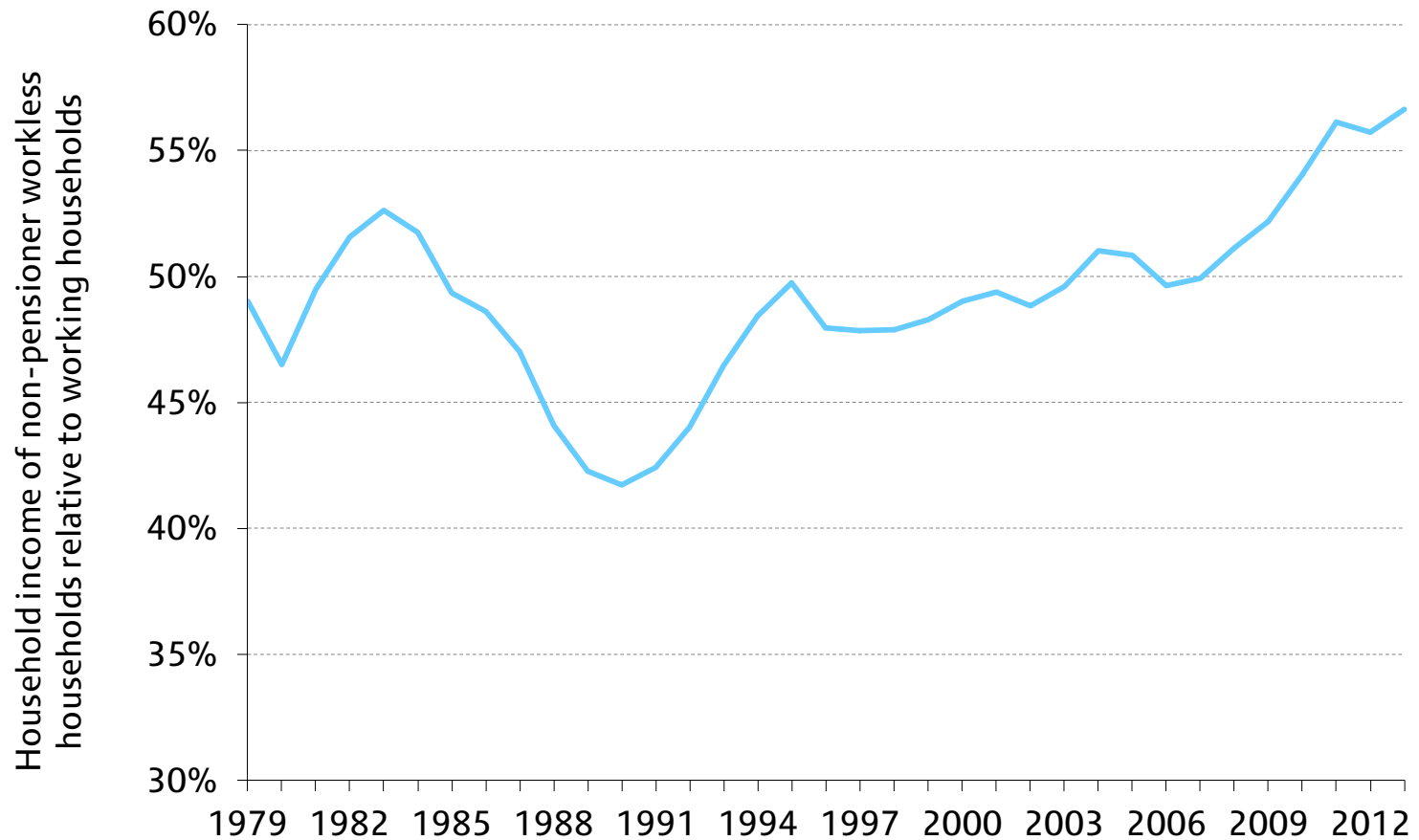
Source: Figure 7c Belfield et al. (forthcoming)

# Earnings to income for working households



Source: Figure 7a Belfield et al. (forthcoming)

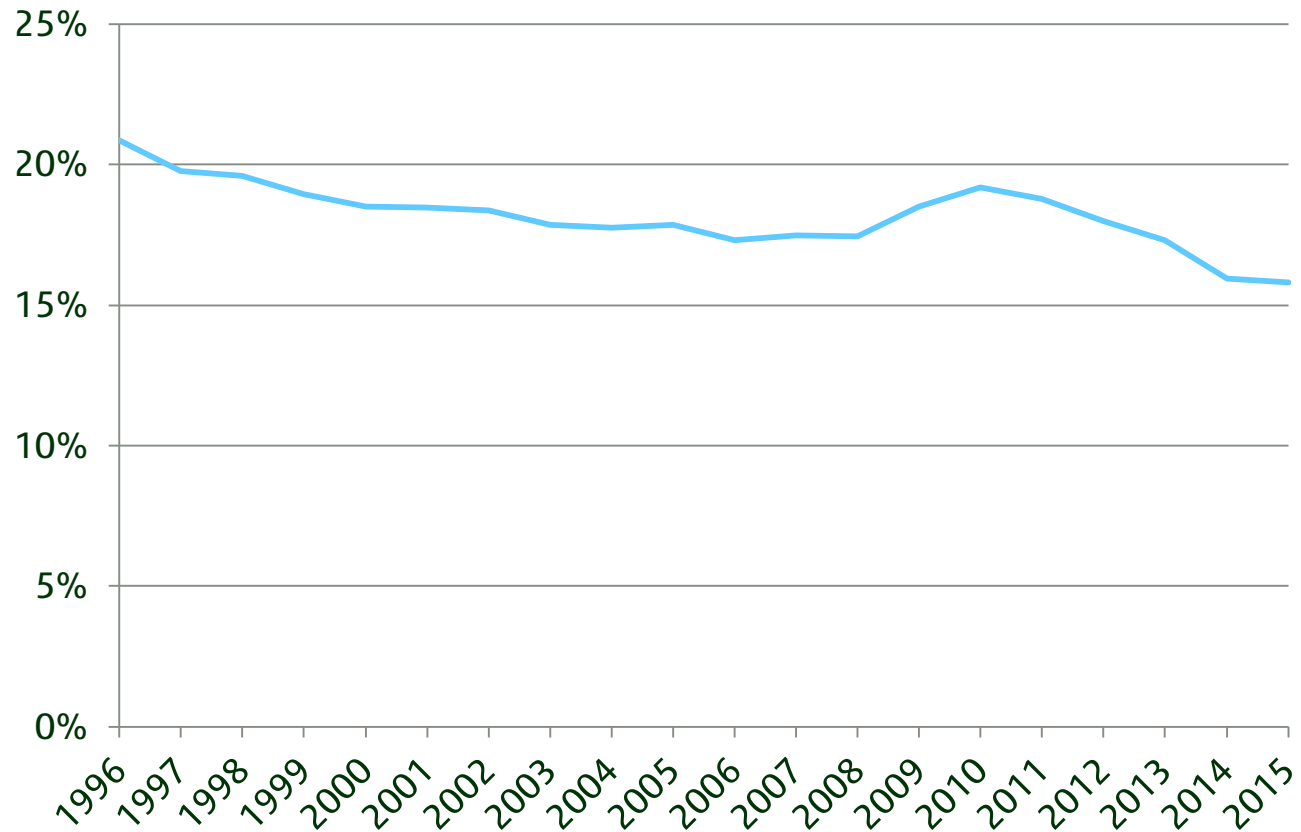
# Workless household incomes



Source: Figure 3.7 *Belfield et al. (2015)*

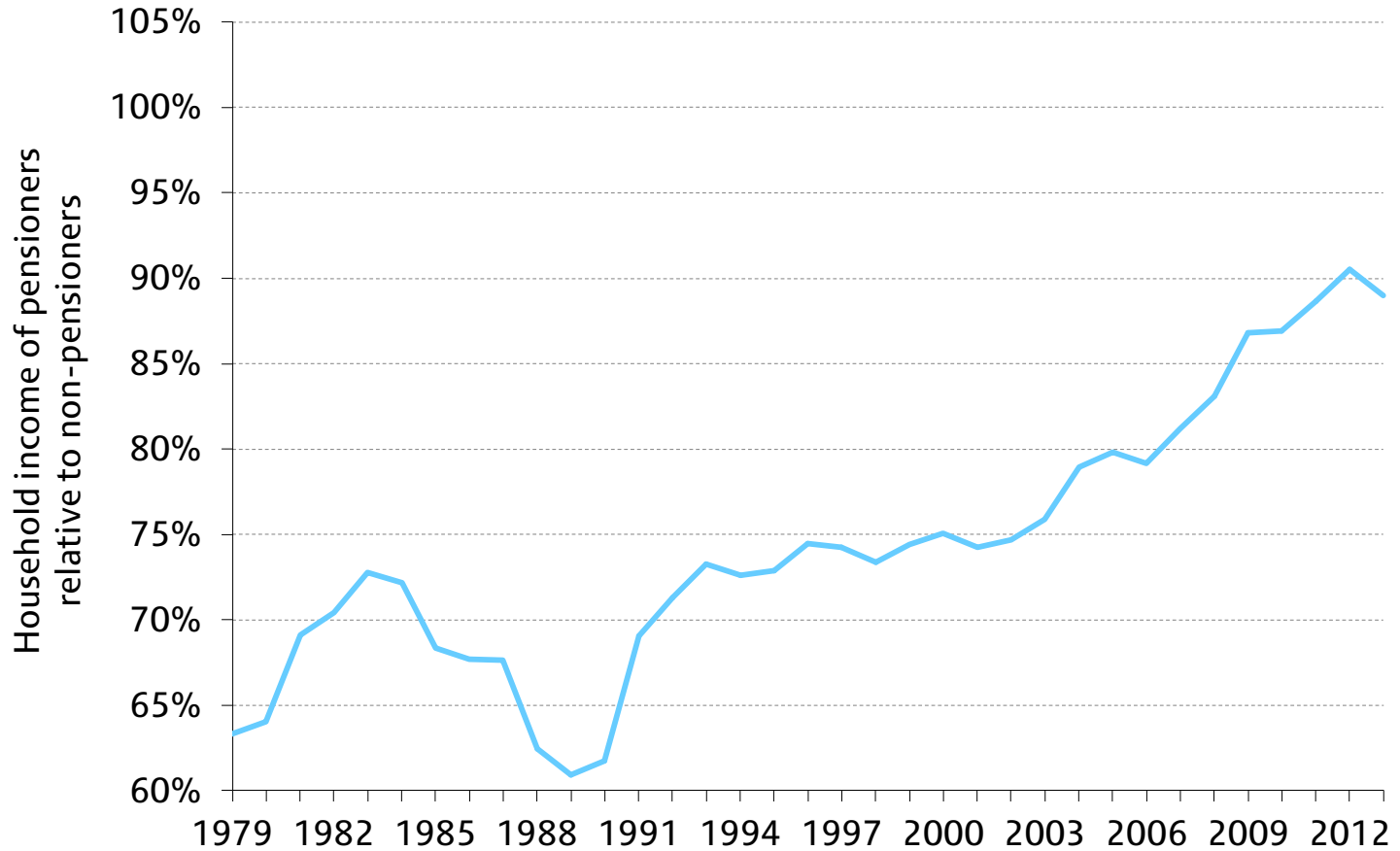


# Proportion of workless households



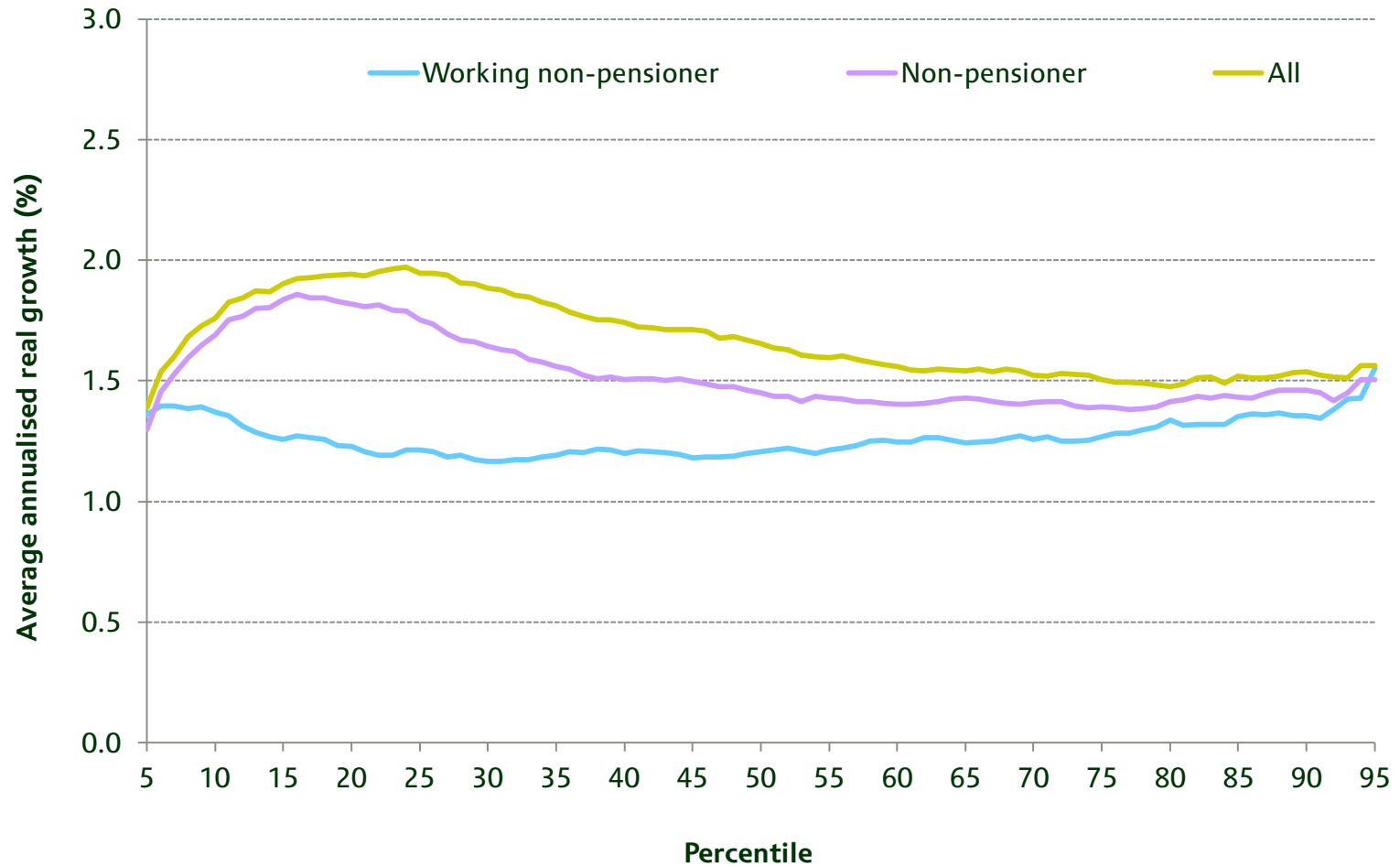
Source: Figure 3.7 *Belfield et al. (2015)*

# Pensioner incomes



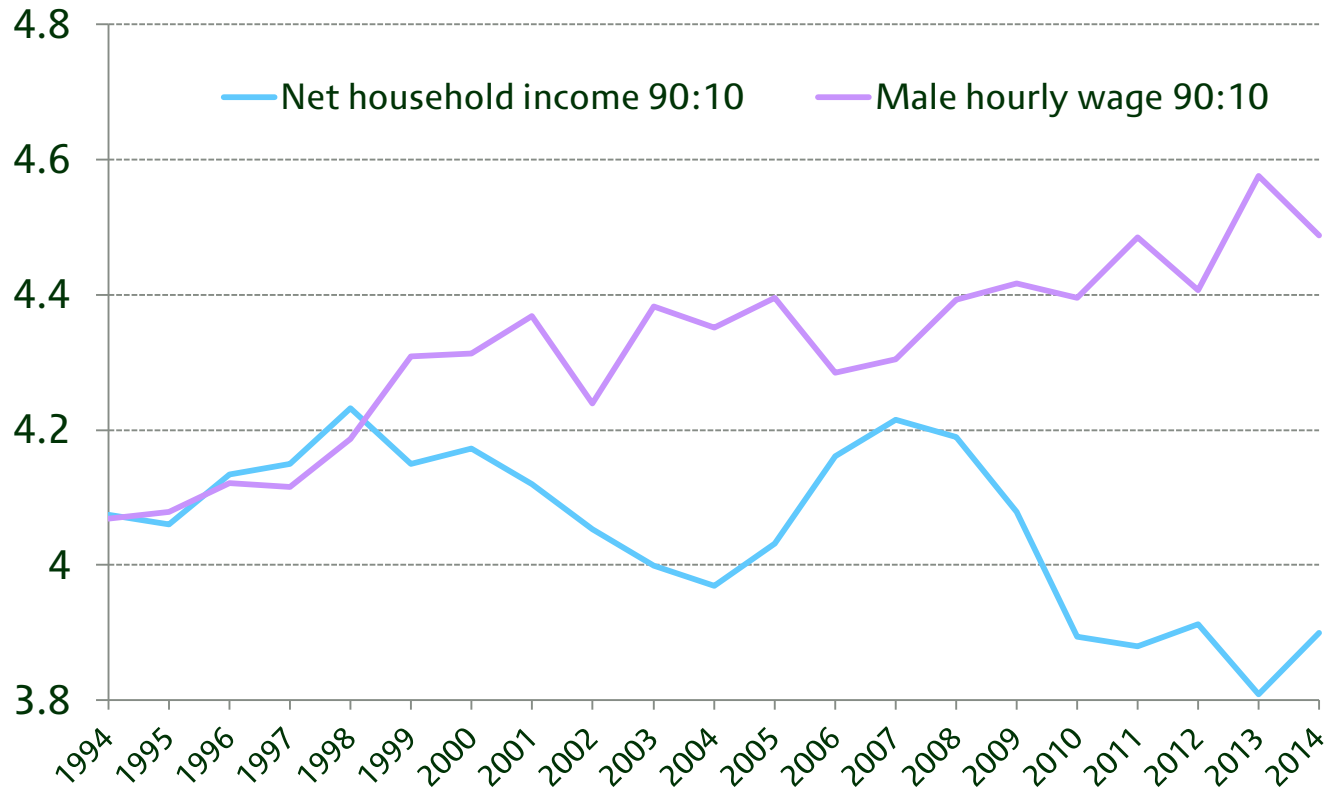
Source: Figure 3.6 *Belfield et al. (2016)*

# Earnings to income for working households



Source: Figure 7a Belfield et al. (forthcoming)

# Inequality in the UK since 1990



Source: Figure 4 *Belfield et al. (forthcoming)*

# Summary

- When using measures of living standards it is important to **correctly** account for inflation and household composition
- Income inequality rose rapidly in the 1980s...
- ...but in the last twenty years income inequality has fallen amongst **most** of the population
- This was due to redistributive taxes and benefit changes and the catch up of pensioner and workless household incomes
- But the top 1% have continued to pull away during this period

# References (1)

- Acemoglu, D. (2002) “Technical Change, Inequality and the Labor Market”, *Journal of Economic Literature* 40 (1)
- Adam, S., and Browne, J. (2010) “Redistribution, work incentives and thirty years of UK tax and benefit reform”, IFS Working Paper 10/24
- Belfield, C., Blundell, R., Cribb, J., Hood, A., and Joyce, R. (Forthcoming) *Two Decades of Income Inequality in Britain: The Role of Wages, Household Earnings and Redistribution* *Economica*
- Belfield, C., Cribb, J., Hood, A., and Joyce, R. (2016) *Living standards, poverty and inequality in the UK: 2014*, Institute for Fiscal Studies Report
- Belfield, C., Cribb, J., Hood, A., and Joyce, R. (2015) *Living standards, poverty and inequality in the UK: 2014*, Institute for Fiscal Studies Report R96
- Belfield, C., Cribb, J., Hood, A., and Joyce, R. (2014) *Living standards, poverty and inequality in the UK: 2014*, Institute for Fiscal Studies Report R96
- Belfield, C., Blundell, R., Cribb, J., Hood, A., and Joyce, R. (2017) “
- Brewer, M., and O’Dea, C. (2012) “Measuring Living Standards with income and consumption: Evidence from the UK”, IFS Working Paper W12/12
- Browne, J., Hood, A. and Joyce, R. (2013) “Child and working-age poverty in Northern Ireland from 2010 to 2020”, IFS Report R78
- Cribb, J., Hood, A., Joyce, R., and Phillips, D. (2013) “Living Standards, Poverty and Inequality in the UK: 2013” IFS Report R81

# References (2)

- Cribb, J., Joyce, R., and Phillips, D. (2012) “Living Standards, Poverty and Inequality in the UK: 2013” IFS Report RX
- Goldin, C., and Katz, L. (2008) “The Race Between Education and Technology”, Harvard University Press, Cambridge MA
- Goodman, A. and Shephard, A. (2002), Inequality and living standards in Great Britain: some facts, IFS Briefing Note 19 , Institute for Fiscal Studies, London
- Gregg , P. and Wadsworth ,J. (2008) “Two Sides to Every Story: Measuring Polarization and Inequality in the Distribution of Work”, Journal of the Royal Statistical Society Series A
- Machin, S. (2001) “The Changing Nature of Labour Demand in the New Economy and Skill-Biased Technology Change”, Oxford Bulletin of Economics and Statistics 63 (S1)
- Mookherjee and Shorrocks (1982) A Decomposition Analysis of the Trend in UK Income Inequality, The Economic Journal, 92(368), pp. 886–902
- Ravallion, M., Datt, G., and van de Walle, D. (1991) “Quantifying Absolute Poverty in the Developing World,” Review of Income and Wealth no.37 pp 345-361

# Extra slides



# Variance of logs decomposition

$$\text{var}(\log(wh)) \equiv \text{var}(\log(w)) + \text{var}(\log(h)) + 2\text{cov}(\log(w), \log(h))$$

	Variance of log earnings at start of period	Change in variance of log earnings	<i>Contribution to change</i>		
			<i>Variance of log hours</i>	<i>Variance of log wage</i>	<i>Covariance of log hours and log wage</i>
<i>Men</i>					
1994-1997	18.18	2.22	0.74	1.02	0.45
1997-2004	20.39	2.82	0.29	1.52	1.01
2004-2007	23.21	0.82	0.06	0.12	0.64
2007-2014	24.03	2.72	0.26	1.99	0.47
<b>1994-2014</b>	18.18	8.58	1.35	4.65	2.58
<i>Women</i>					
1994-1997	41.34	-1.57	-0.66	1.83	-2.74
1997-2004	39.77	-3.99	-3.64	-1.94	1.59
2004-2007	35.78	-0.77	-0.60	0.28	-0.45
2007-2014	35.01	-1.77	-0.68	-0.08	-1.01
<b>1994-2014</b>	41.34	-8.10	-5.57	0.08	-2.60

# MLD decomposition – working households

$$\Delta I_0 = \Sigma_k \bar{s}_k \Delta I_{0,k} + \Sigma_k \Delta s_k \bar{I}_{0,k} + \Sigma_k \Delta s_k (\bar{\lambda}_k - \overline{\log \lambda_k}) + \Sigma_k (\bar{\theta}_k - \bar{s}_k) \log \mu_k$$

*Contribution to change in Mean Log Deviation*

	MLD at start of period	Overall change in MLD	<i>Within group inequality</i>	<i>Within group - changes in population share</i>	<i>Between group - changes in population share</i>	<i>Between group inequality</i>
1994-1997	9.85	0.07	0.36	0.04	-0.21	-0.13
1997-2004	9.92	-0.64	-0.25	0.04	-0.22	-0.21
2004-2007	9.28	0.73	0.58	0.00	0.00	0.15
2007-2014	10.02	-1.00	-0.54	0.01	-0.02	-0.45
<b>1994-2014</b>	<b>9.85</b>	<b>-0.83</b>	<b>0.13</b>	<b>0.12</b>	<b>-0.41</b>	<b>-0.68</b>

# MLD decomposition – pensioner households

$$\Delta I_0 = \Sigma_k \bar{s}_k \Delta I_{0,k} + \Sigma_k \Delta s_k \bar{I}_{0,k} + \Sigma_k \Delta s_k (\bar{\lambda}_k - \overline{\log \lambda_k}) + \Sigma_k (\bar{\theta}_k - \bar{s}_k) \log \mu_k$$

*Contribution to change in Mean Log Deviation*

	MLD at start of period	Overall change in MLD	<i>Within group inequality</i>	<i>Within group - changes in population share</i>	<i>Between group - changes in population share</i>	<i>Between group inequality</i>
1994-1997	9.78	0.08	0.11	0.00	0.00	-0.04
1997-2004	9.86	-0.75	-0.69	-0.01	0.01	-0.06
2004-2007	9.10	0.74	0.77	0.00	0.00	-0.03
2007-2014	9.84	-1.09	-0.89	-0.02	0.01	-0.19
<b>1994-2014</b>	<b>9.78</b>	<b>-1.03</b>	<b>-0.70</b>	<b>-0.02</b>	<b>0.02</b>	<b>-0.32</b>